RICE UNIVERSITY

Virtual Teams: A Qualitative and Quantitative Review of Best Practices

by

Christina U. Zimmer

A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE

Doctor of Philosophy

APPROVED, THESIS COMMITTEE

Anton J. Villado, Ph.D., Chair
Assistant Professor of Psychology

Margaret E. Beier, Ph.D.
Associate Professor of Psychology

Michelle Hebl, Ph.D.
Professor of Psychology

Rick Wilson, Ph.D.
Professor of Political Science

HOUSTON, TEXAS
AUGUST 2015
ABSTRACT

Virtual Teams: A Qualitative and Quantitative Review of Best Practices

by

Christina U. Zimmer

Corporate activity is shifting towards globalization, and communication technologies are becoming more sophisticated, facilitating a quicker pace of change within organizations (Bell & Kozlowski, 2002). Thus, organizations are using virtual teams (teams who primarily rely on technology to communicate) to accomplish work more effectively and efficiently. Growing in tandem with organizations’ increasing reliance on virtual teams are the number of articles in the popular business press suggesting “best practices” for these teams (e.g., Forbes, Harvard Business Review). It remains to be seen, however, whether these best practices are substantiated by empirical research. Thus, the purpose of the current study is to (a) meta-analytically test the best practices found in the popular business press to determine whether they are supported by empirical evidence and (b) review theoretical qualitative evidence that supports or refutes the best practice when direct empirical tests are absent. The results suggested that many of the general categories of virtual team best practices from the popular business press were supported by empirical research (i.e., communication, community, leadership, and structured work). Other best practices received less support (i.e., selection), had mixed support (i.e., conflict), or were unable to be tested (i.e., cultural sensitivity and order of face-to-face communication). The more specific best practices did not receive equal attention in the empirical literature, and with the exception of trust, were supported by
few studies or unable to be tested. Finally, the relationships between virtual team best practices and important outcomes might be more nuanced than they appear in the popular business press. The moderator analysis suggested team size and type of performance outcome influence the virtual team best practice-outcome relationship, such that small and large teams generally benefit more from virtual team best practices than medium teams, and best practices generally impact satisfaction outcomes to a greater extent than performance. These results contribute to the empirical literature by providing a comprehensive qualitative and quantitative review of empirically tested popular business press best practices of virtual teams as well as serving as a catalyst for future research and as a practical reference for practitioners working in organizations that use virtual teams.
ACKNOWLEDGEMENTS

My thesis would not have been possible without the guidance and support of several individuals. It is with great appreciation that I acknowledge Anton J. Villado for his invaluable contributions to this project. Without his edits, knowledge, and enthusiasm, this project would not have been completed. I also would like to thank my other committee members, Margaret Beier, Mikki Hebl, and Rick Wilson, whose insightful comments and suggestions have greatly enhanced this paper. It has been a pleasure working with each of you.

I am grateful to the psychology department administrator, Lanita Martin, and coordinator, Jennifer Gucwa, for their patience in answering my many questions and for simplifying the administrative component of this dissertation. I also am thankful to my fellow graduate students and officemates, Katie O’Brien and Jason Randall. Graduate school would not have been the same (or half as fun) without you.

I would like to thank my parents, Barbara and Michael Upchurch, who passed on their love of learning to me and always encouraged me to believe any achievement is possible. Finally, I would like to thank my husband, Andrew Zimmer, whose endless support made this project possible. You give meaning to all accomplishments.
## Table of Contents

List of Tables ................................................................................................................. ix

CHAPTER 1: Introduction ................................................................................................. 111

CHAPTER 2: Virtual Teams and Best Practice Identification .............................................. 12

2.1 Defining Virtual Teams .............................................................................................. 12

2.2 Identifying Best Practices of Virtual Teams ............................................................... 17

CHAPTER 3: Best Practices .............................................................................................. 22

3.1 Composition: Select Team Members .......................................................................... 22

3.1.1 Selection ................................................................................................................. 24

3.1.2 Configuration .......................................................................................................... 25

3.2 Communication: Leverage Technology ...................................................................... 26

3.2.1 Communication Technology Medium .................................................................... 27

3.2.2 Effective Communication Strategies ...................................................................... 33

3.3 Community: Develop Interpersonal Relationships ...................................................... 36

3.4 Conflict Management ............................................................................................... 40

3.4.1 Antecedents of Conflict Management in Virtual Teams .......................................... 43

3.4.1.1 Shared Context .................................................................................................... 43

3.4.1.2 Familiarity .......................................................................................................... 43

3.4.1.3 Friendship ......................................................................................................... 44

3.4.1.4 Homogeneity ..................................................................................................... 44
3.4.2 Conflict Management in Virtual Teams .................................................................44
3.5 Commitment and Coordination: Emergent and Formal Leadership ....................46
  3.5.1 Commitment: Engage Team Members ...............................................................47
  3.5.2 Coordination: Structure Work .............................................................................50
3.6 Contact: Meet Face-to-face .....................................................................................52
3.7 Cross-cultural Implications: Recognizing Similariies and Differences ...................54
3.8 Moderators ..............................................................................................................58
  3.8.1 Team Size ...........................................................................................................59
  3.8.2 Team Outcomes .................................................................................................59
3.9 The Present Study ..................................................................................................60
  3.8.1 Summary of Study Hypotheses .........................................................................60
CHAPTER 4: Method ......................................................................................................63
4.1 Literature Review and Inclusion Criteria .................................................................63
4.2 Coding Procedure ..................................................................................................64
  4.2.1 Moderators ........................................................................................................65
4.3 Independence of Data Points ..................................................................................65
4.4 Data Set ..................................................................................................................65
  4.4.1 Outliers .............................................................................................................66
4.5 Statistical Analyses .................................................................................................66
CHAPTER 5: Results .................................................................68

5.1 Overall Results ...............................................................68

5.2 Main Results (Level 1 and Level 2 Best Practices) ...............68

  5.2.1 Composition: Select Team Members .................................................68
  5.2.1 Communication: Leverage Technology ............................................70
  5.2.3 Community: Develop Interpersonal Relationships .......................71
  5.2.4 Conflict Management ..................................................................73
  5.2.5 Commitment (Leadership) ............................................................73
  5.2.6 Coordination ...............................................................................74
  5.2.7 Contact and Cross-cultural Implications .........................................74

5.3 Moderators ...........................................................................75

  5.3.1 Team Size ................................................................................75
  5.3.2 Performance Type .......................................................................75

CHAPTER 6: Discussion ...............................................................88

6.1 General Discussion ...............................................................88

6.2 Level 1 and Level 2 Best Practices ..........................................89

6.3 Moderators ...........................................................................98

  6.3.1 Team Size ................................................................................98
  6.3.2 Performance Type .......................................................................98
Level 2 Best Practices

157
List of Tables

Table 1. .........................................................................................................................20
Table 2. .........................................................................................................................21
Table 3. .........................................................................................................................78
Table 4. .........................................................................................................................79
Table 5. .........................................................................................................................81
Table 6. .........................................................................................................................83
Table 7. .........................................................................................................................85
CHAPTER 1: Introduction

The way in which organizations accomplish work is changing. Corporate activity has shifted towards globalization and from production to service- or knowledge-based work environments. Additionally, information and communication technologies have become more sophisticated, facilitating a faster pace of change within organizations (Bell & Kozlowski, 2002). Thus, the nature of work is becoming increasingly complex and dynamic (Burke, Pierce, & Salas, 2006; Pulakos, Arad, Donovan, & Plamondon, 2000). In order to address this increased complexity and dynamism, organizations have shifted towards more team-based work and horizontal organization structures.

As a result of this shift towards globalization and flatter organizations coupled with opportunities provided by advancements in technology, organizations are often using virtual teams (teams who primarily rely on technology to communicate) to accomplish work more effectively and efficiently. Thus, the use of virtual teams is both pervasive and rising. For example, a survey conducted in 2012 found that approximately 66% of global organizations were using virtual teams (Society for Human Resource Management, 2012). Additionally, a survey conducted by the Institute for Corporate Productivity (i4cp) in 2008 reported that 67% of the over 250 surveyed organizations expected an increased reliance on virtual teams within their company over the next three years, and this percentage increased to 80% in larger organizations (over 10,000 employees).

Virtual teams offer many benefits to organizations, particularly in cost reduction of logistical expenses (Robbins & Judge, 2007) and increased adaptability. Virtual teams facilitate the use of the most capable individuals for a project or task regardless of their
location across the globe, can accomplish work more quickly by allowing around-the-clock work due to time zone differences, and can increase work flexibility for employees (Bell & Kozlowski, 2002). These benefits of virtual teams help organizations manage the globalization of business, the movement towards horizontal organizational structures, and customers’ demands for increased efficiency (Avolio, Kahai, & Doge, 2000; Bell & Kozlowski, 2002; Driskell, Radtke, & Salas, 2003; Dundis & Benson, 2003). As task complexity increases, these advantages become crucial for organizations to ensure they have a competitive advantage and are capitalizing on the expertise of their most qualified employees.

Despite the many benefits, skepticism still exists about the purported advantages of virtual teams. Some argue that virtual teams can hinder performance by being more susceptible to conflicts due to reducing team members’ ability to engage in spontaneous communication (Hinds & Mortensen, 2005), hampering cohesion and collaboration among team members (Warkentin, Sayeed, & Hightower, 1997), decreasing the awareness of other members’ knowledge (Nofi, 2000), thwarting the development of common ground due to a lack of informal communication avenues and opportunities (Espinosa, Slaughter, Kraut, & Herbsleb, 2007), and creating barriers to establishing a shared understanding among team members (Montoya-Weiss, Massey, & Song, 2001; Tan, Wei, Huang, & Ng, 2000). In support of the existing skepticism around the advantages of virtual teams, the results of several meta-analyses that compare the effectiveness of virtual teams to face-to-face teams suggest that virtual teams are less effective than face-to-face teams on a number of important outcomes (Baltes, Dickson, Sherman, Bauer, & LaGanke, 2002; Benbasat & Lim, 1993; Dennis, Wixom, &
Despite these potential disadvantages, technological advances and a global workforce are causing organizations to view virtual teams a necessity. Growing in tandem with organizations’ increasing reliance on virtual teams is the number of popular business press articles (e.g., Forbes, Harvard Business Review, Inc) suggesting “best practices” for virtual teams. It remains to be seen, however, whether these best practices are substantiated by empirical research. Although there are numerous reviews, meta-analyses, and primary articles investigating virtual teams, there is not an organized single source for empirically tested best practices of virtual teams. Therefore, the goal of the present effort was to examine and quantify the empirical work that addresses these popular business press virtual team best practices. Accordingly, the current study will use meta-analytic procedures to test the best practices. A meta-analysis quantitatively integrates the results of other studies, and unlike narrative reviews, meta-analyses adjust for sample size and measure reliability, providing more accurate estimates of the construct relationships. Thus, the purpose of the current study is to (a) meta-analytically test the best practices found in the popular business press literature to determine whether these best practices are supported by empirical evidence and (b) review theoretical qualitative evidence that supports or refutes the best practices when direct empirical tests of the best practices are absent.

This study intended to provide an important contribution to the empirical literature by conducting a comprehensive qualitative and quantitative review of empirically-tested popular business press best practices for virtual teams as well as serve
as a practical reference for individuals working in organizations. Furthermore, the results of this study were intended to serve as a catalyst for future research for the virtual team best practices identified in the popular business press that have yet to be examined in the empirical literature.

This dissertation will begin by defining virtual teams. I then will present the best practice themes that emerged from the popular business press that will provide the framework for the remainder of the dissertation. For each best practice category, I will discuss popular press best practices that correspond to each best practice category, present the psychological mechanism that accounts for the unique challenges faced by virtual teams in this area, and review the empirical work that falls into this domain. I will then detail the method used to conduct the meta-analysis of best practices, and next I will review the meta-analytic results for each hypothesis. Finally, I will discuss the results in the context of their implications for both researchers and practitioners.
CHAPTER 2: Virtual Teams and Best Practice Identification

2.1 Defining Virtual Teams

Teams are widely leveraged within organizations to increase the efficiency and effectiveness of their workforce. “A team is a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems, and who manage their relationship across organizational boundaries” (Cohen & Baily, 1997, p. 241). Virtual teams are a special type of team in which at least one of the team members works at a different location, organization, or at a different time so that team communication is predominantly based on electronic communication media (Hertel, Geister, & Konradt, 2005).

The definition of virtual teams has evolved over time. Townsend and colleagues (1998, p. 17) originally defined virtual teams as “groups of geographically and/or organizationally dispersed coworkers who are assembled using a combination of telecommunications and information technologies to accomplish an organizational task.” Thus, virtual team members leverage technology to span locational, temporal, and relational boundaries in order to accomplish an interdependent task (Martins, Gilson, & Maynard, 2004). Locational boundary is the physical dispersion of team members, and members can be dispersed in different geographic locations or in different work spaces within the same location. Temporal boundary refers to the dynamism aspect of virtual teams, such as its lifecycle (temporary or ongoing team) and synchronicity (timing of member interaction when accomplishing a task). Finally, the relational boundary is any differences in the virtual team members’ networks (e.g., association with other teams,
departments, or cultures; Martins et al., 2004). The degree to which a team utilizes technology to accomplish their objective will affect the extent of the team’s virtuality (Bell & Kozlowski, 2002; Griffith, Sawyer, & Neal, 2003). However, many contemporary definitions of virtual teams highlight the dimension of geographical distance as a defining characteristic of virtual team. For example, Bell and Kozlowski state that “the most critical and important feature of virtual teams is that they cross boundaries of space” (2002, p. 22).

Kirkman and Mathieu (2005) argue, however, that although geographical distance among team members will likely lead teams to utilize more virtual means to communicate and adopt a task, it is not a requisite for a team to be considered virtual. Thus, Kirkman and Mathieu define virtual teams with three dimensions: “(a) the extent to which team members use virtual tools to coordinate and execute team processes (including communication media such as video conferencing and work tools such as group decision support systems [GDSS]), (b) the amount of informational value provided by such tools, and (c) the synchronicity of team member virtual interaction” (p. 702).

Previous frameworks for defining virtual teams have not accounted for important differences in the information richness and synchronicity afforded by the virtual tools and how these factors might influence team virtuality. Thus, other models have not included Kirkman and Mathieu’s (2005) latter two dimensions (b and c) in their definitions (e.g., Cohen & Gibson, 2003; Griffith & Neal, 2001; Griffith et al., 2003).

The present study employs the virtual team definition that is consistent with the contemporary literature: virtual teams rely on technology to accomplish an interdependent task, spanning locational, temporal, and relational boundaries, and
identifies the extent of a team’s virtuality in a manner that is consistent with Kirkman and Mathieu (2005). Although, geographical distance can be an important element of a virtual team, it is not necessarily the geographical distance that incites unique challenges for virtual teams, but rather the extent to which a virtual team must rely on technology and the richness of that technology. Virtual team members who work in the same building but never meet face-to-face and rely on the same technology as a globally distributed virtual team would be considered similar on their extent of “virtuality,” even though the former team maintains no geographical distance.

2.2 Identifying Best Practices of Virtual Teams

Concurrent with organizations’ increasing reliance on virtual teams is the rise in virtual team best practices promulgated by the popular business press. Numerous business press outlets (see Table 1) have put forth “best practice” lists for composing, managing, and participating in virtual teams that will lead to desired virtual team outcomes.

According to one popular business press outlet, The Wall Street Journal, 89% of their digital content readers have reported taking action based on the content featured on the website (http://wsjdigitalsolutions.com/about/, 2012). Thus, the popular business press can influence organizational practices in that individuals are consuming the best practices promoted by these outlets and likely taking action based upon their recommendations. Consequently, it is crucial to evaluate the best practices from these outlets to determine whether they are substantiated by empirical work.

In order to resolve the potential disconnect between the popular business press and empirical research best practices, it is necessary to examine the extent to which the
extant empirical literature supports, refutes, or does not test the best practices recommended by popular business outlets. To accomplish this objective, I identified popular press best practices by searching the most popular business publications (magazines and newspapers) for “virtual team” and “global team” (see Table 1 for a list of publications searched and number of identified articles). Any list that gave tips, recommendations, or principles for improving the overall effectiveness or efficiency of virtual teams and were specific to virtual teams (not a virtual workforce or telecommuting in general) were retained, which resulted in 100 best practices. Several themes emerged within the identified best practices, and these practices were categorized into eight domains (subsequently referred to as Level 1 dimensions; see Table 2): composition, communication, community, conflict, commitment, coordination, contact, and cross-cultural.

A doctoral student also categorized the popular business press best practices into Level 1 categories. The previously identified Level 1 best practices emerged, with the exception of cross-cultural. The second coder categorized the Level 2 best practices that I assigned to the cross-cultural category (e.g., agree on a shared language, increase cross-cultural awareness, prioritize cultural sensitivity) as various other Level 1 categories (e.g., structure work, commitment, socialization). Given the clear cultural component of these best practices and the heightened importance of cultural sensitivity in global virtual teams, I retained cross-cultural as a Level 1 best practice. Two additional Level 1 categories were identified by the second coder: motivation and performance management. For motivation, the specific best practices pertained to goal setting. Although goal setting is clearly related to motivation, I classified goal setting as a tool
that can be used to structure work, recognizing motivation is the psychological mechanism that is likely accounting for the relationship between structuring work through goal setting and performance outcomes. This is consistent with the treatment of goal setting in virtual team literature (e.g., Powell, Piccoli, & Ives, 2004). Finally, two specific best practices were categorized as performance management. Both of these specific best practices discussed results; however, the specific behaviors associated with the best practice were more aligned with other Level 1 best practice categories. Thus, the two additional Level 1 Best Practice categories identified by the second coder were not retained.

The best practices within each Level 1 domain were further disaggregated to capture the variation within each domain. This disaggregation produced 32 unique categories across all Level 1 dimensions (these categories are subsequently referred to as Level 2 dimensions; see Appendix A). Although all identified popular business press best practices appear in Appendix A for the sake of completeness, the current study will focus on and test the best practices that are psychological in nature. For example, the best practices concerning hiring individuals in specific locations are not underpinned by a psychological mechanism, and thus will not be tested.
<table>
<thead>
<tr>
<th>Business Publication</th>
<th>Print Circulation (2012)</th>
<th>Unique Website Visitors/Month</th>
<th>Total Virtual Team Articles</th>
<th>Total Virtual Team Tips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bloomberg Businessweek</td>
<td>989,186</td>
<td>24 million (2014)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Corporate Education Group</td>
<td>---</td>
<td>---</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Entrepreneur</td>
<td>657,097</td>
<td>9 million (2014)</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Fast Company</td>
<td>795,703</td>
<td>1.2 million (2011)</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Forbes</td>
<td>931,558</td>
<td>17 million (2009)</td>
<td>6</td>
<td>32</td>
</tr>
<tr>
<td>Fortune</td>
<td>857,431</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Harvard Business Review</td>
<td>261,864</td>
<td>3.4 million (2013)</td>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>Inc.</td>
<td>783,119</td>
<td>---</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>The Economist</td>
<td>816,665</td>
<td>9.5 million (2014)</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Wall Street Journal</td>
<td>1,480,725</td>
<td>31.3 million (898,102 digital subscribers; 2013)</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Wired</td>
<td>858,818</td>
<td>19 million (2013)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Note. Total Virtual Team Articles = total number of articles addressing virtual team effectiveness; Total Virtual Team Tips = sum of virtual team tips across all articles from each source.
Table 2  
*Best Practice Categories and Description*

<table>
<thead>
<tr>
<th>Level 1 Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composition</td>
<td>Selection and configuration of virtual team members</td>
</tr>
<tr>
<td>Communication</td>
<td>Selecting appropriate technology to enable communication about the task and leveraging technology to avoid communication challenges</td>
</tr>
<tr>
<td>Community</td>
<td>Development of interpersonal relationships, trust, and cohesiveness among group members</td>
</tr>
<tr>
<td>Conflict</td>
<td>Identification and management of task, relationship, and process conflict</td>
</tr>
<tr>
<td>Commitment</td>
<td>Use of formal and emergent leadership strategies to boost engagement, empowerment, and commitment to the team and task</td>
</tr>
<tr>
<td>Coordination</td>
<td>Structure work through the utilization of formal processes and strategies</td>
</tr>
<tr>
<td>Contact</td>
<td>Timing and extent of face-to-face contact of virtual team members</td>
</tr>
<tr>
<td>Cross-cultural</td>
<td>Recognizing similarities and differences across global virtual team members</td>
</tr>
</tbody>
</table>

Despite the numerous best practices from the popular business press, it remains unseen whether these best practices are supported by empirical work. Thus, the purpose of the current study is to (a) meta-analytically test the best practices found in the popular business literature to determine whether these best practices are supported by empirical evidence, and (b) review theoretical qualitative evidence that supports or refutes the best practice when direct empirical tests of the best practices are absent. In order to provide a framework for the discussion of these best practices, I will introduce the overall best practice category (Level 1 Dimension), present the best practices put forth by the popular business literature, identify the underlying psychological mechanisms that result in unique challenges for virtual teams, and discuss the pertinent existing empirical evidence.
CHAPTER 3: Virtual Team Best Practices

3.1 Composition: Select Team Members

Composing a virtual team, including the selection and configuration of team members’ individual differences, is an important team input (Bell, 2007), and accordingly, popular business press outlets suggest a number of best practices for virtual team composition. Virtual team selection best practices are drawn from six unique popular business press outlets for a total of sixteen selection best practices. These best practices fall into five Level 2 categories: experience, location, interview, network, and KSAOs. Experience refers to whether the employee has previous experience working in a virtual environment, location refers to logistical considerations (e.g., selecting individuals in hubs), and interview concerns the development of an interview process for virtual team members. Network is selecting individuals who are “boundary spanners,” those who can connect the team with pertinent individuals within the organizations. Finally, KSAOs are specific knowledge, skills, abilities and other characteristics that contribute to effective virtual team performance. Consistent with the empirical literature on virtual team member KSAOs, the best practices advocate selecting virtual team members who have strong self-management, communication, and technology skills.

The popular business press recommends fewer configuration best practices, compared to selection best practices, and there are three best practices from three unique sources. Each of these practices reflects a unique Level 2 category within team configuration: diversity, network, and number of members. The popular business press suggests that a team should be composed of individuals with diverse but complementary
skills and experience (diversity) and with a few members who already know each other (network).

Compared to non-virtual teams, virtual teams have more flexibility in team composition, given their ability to utilize members from across the organization, despite their geographical location. Another way in which virtual team selection and composition differ from non-virtual teams is the potential for status-equalization within virtual teams. Virtual teams may limit the impact of member status given that status cues are less noticeable in virtual teams, compared to face-to-face teams, leading to more equal participation across members of different statuses. However, the empirical results for status-equalization are mixed. Some argue that the effect of member status is mitigated by the use of virtual team and the corresponding lack of visual cues, rendering composition less salient (Sproull & Kielser, 1986), particularly for surface-level traits (e.g., sex, race). The status-equalization effect is facilitated by virtual teams’ reliance on technology to communicate. For example, the use of e-mail for communication has been found to be related to a reduction in status inequalities (Dubrovsky, Kiesler, & Sethna, 1991). E-mail allows individuals more access to higher-level employees within the organization, who often have busy schedules and can be difficult to schedule for a face-to-face meeting (Sproull & Kiesler, 1986). Thus, compared to face-to-face teams, virtual team members might feel more comfortable and thus increase their interactions with higher status members of the organization.

Despite some support for status-equalization within virtual teams, other studies do not support an equalization of member status or that group composition affects virtual team decisions (El-Shinnaway & Vinze, 1998; Hollingshead, 1996). Virtual team
members tend to recreate hierarchies that would be formed in a face-to-face context in order to preserve status differentials (Owens, Neal, & Sutton, 2000). This is accomplished through high-status members contributing more, identifying their contributions as greater than other team members, and giving themselves high self-ratings (Weisband, Schnieder, & Connolly, 1995). In-group/out-group dynamics still come into play for virtual teams and out-group members of virtual team have been perceived by in-group members as not putting in enough effort and being aggressive (Cramton, 2001). Minority members have been found to be more likely to voice their opinions when they can remain anonymous; however, their opinions were given greater attention in a face-to-face context (McLeod, Baron, Weighner Marti, & KuhYoon, 1997).

Thus, the flexibility afforded to virtual teams, potential status equalization, and other inherent characteristics of virtual teams contribute to using potentially different strategies for selecting and composing virtual teams, compared to non-virtual teams.

3.1.1 Selection. The majority of the knowledge, skills, abilities, and other characteristics (KSAOs) needed to perform well in a virtual team environment are consistent with the KSAOs that are needed to perform effectively in a non-virtual team environment, given that the tasks of virtual and non-virtual teams are similar and that teamwork skills are found to be generalizable across contexts (Stout, Cannon-Bowers, Salas, & Morgan, 1990). However, there are additional KSAOs essential for virtual teams due to the unique challenges that arise from relying on technology to communicate and often working in a global environment (Blackburn, Furst, & Rosen, 2003).

For individuals, it is crucial that virtual team members have the following knowledge, skills, and abilities: self-management, virtual communication, cultural
sensitivity, trust building, and technology competence. The importance of one’s ability to self-manage is elevated in virtual teams, given that virtual team members can often operate in isolation, and there is less structure. Thus, successful virtual team members should be proactive and take initiative to accomplish work. Individuals who are able to self-regulate (guide goal-directed activities over time and across variable situations [Karoly, 1993]) and skilled in time management are ideal candidates for virtual teams. The other individual-level KSAOs deemed crucial for individuals operating in a virtual team environment (i.e., virtual communication, cultural sensitivity, trust building, and technology competence) will be discussed in greater detail in other sections of this manuscript.

In addition to the above KSAOs identified by Blackburn et al. (2003), the relationship between certain personality traits and both the preference for working in a virtual environment as well as effective performance in virtual teams versus traditional teams. Individuals who endorse being open to experience tend to prefer virtual teams over face-to-face teams, and extroverts trust the virtual team environment to a greater extent than individuals who identified as introverts (Luse, McElroy, Townsend, and DeMarie (2013). A virtual environment tends to mitigate the relationships between extroversion or openness to experience and effective virtual team performance. For example, individuals high on introversion participate more in online environments versus communicating face-to-face (Townsend et al., 1998).

3.1.2 Configuration. Trait configuration (deep-level characteristics) is an important consideration for composing virtual teams (Turel & Zhang, 2010). High variability of conscientiousness has been found to have a negative impact on team
performance, but variability in extroversion is beneficial to reduce this main effect of variability in conscientiousness. However, another study found that although extraversion has been found to be positively related to participating in virtual groups, variance in extraversion of virtual team members has a marginally negative effect on team member interactions (Potter, & Balthazard, 2002).

Although the configuration of virtual teams on deep-level characteristics (e.g., personality) is still an important consideration for virtual teams, surface-level characteristics (e.g., race, sex) might not be as salient within a virtual team environment, resulting in differing relationships between surface-level characteristics and team outcomes for virtual versus non-virtual teams. For example, sex differences and any associated biases might not be as salient in virtual teams. Women in a virtual team environment perceived team members as more inclusive and were more satisfied, compared to women who were members of non-virtual (exclusively face-to-face) teams (Lind, 1999). Furthermore, virtual team members have been found to be unable to identify an individuals’ sex based on the content of e-mail messages (Nowak, 2003). In addition to the above mentioned characteristics, team member familiarity and experience with working with one another is a team input that has been gaining more attention in the empirical literature (e.g., Bierly, Stark, & Kessler, 2009). Familiarity is critical to the development of trust, particularly for a virtual team (e.g., Aubert & Kelsey, 2003). Co-located team members have increased opportunities to accumulate enhanced information about their team members, which facilitates the team member familiarity process more easily. Virtual teams, on the other hand, do not have these direct, rich channels of communication to familiarize themselves with their team members (Bierly et al., 2009).
Thus, composing virtual teams with members who are already familiar with each other contributes to positive virtual team outcomes.

Although there are eight Level 2 Dimensions for composition, I have generated specific hypotheses to address the six Level 2 Dimensions. For selection, Level 2 categories KSAOs and experience will be collapsed given that experience serves as a proxy for knowledge. There is not a hypothesis specific to developing an interview process, given that the purpose of the interview process is to select team members based on specific criteria, which is embodied in the other selection best practices. There is also not a hypothesis specific to testing the location best practices due to their underlying logistical (e.g., convenience of having members in close locations), rather than psychological concerns. Finally, in accordance with extant literature (e.g., Horwitz & Horwitz, 2007; LePine, Piccolo, Jackson, Matheiu, & Saul, 2008), I will treat team size as an overall moderator, rather than as a predictor variable, and it will be discussed in a subsequent moderator section.

Hypothesis 1: There will be a positive relationship between all identified virtual team composition best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each selection best practice, (a) identified virtual team KSAOs (b) “Boundary spanning,” (c) team diversity on experience and skills and (d) team member familiarity (with each other), will be positively related to important virtual team outcomes (performance, satisfaction, viability).
3.2 Communication: Leverage Technology

Communication is a crucial process to ensure the success of any team. However, unique challenges arise when virtual teams must rely on technology for communication. Operating in a virtual environment removes contextual and nonverbal cues (e.g., facial expressions, eye contact, posture, gestures). These cues provide crucial information “about the individual with whom one is interacting (i.e., does the speaker give evidence of being competent or experienced? Is the speaker a high-status or low-status team member?), how the message is being conveyed (i.e., Is the speaker angry, tense, or confident?), and whether the message is being conveyed successfully (i.e., Are others paying attention? Do they look puzzled?); Driskell et al., 2003, p.298). Thus, operating in a virtual team environment can decrease communication efficiency due to the need to spend more time explaining the context of the conversation (Ahn, Lee, Cho, & Park, 2005; Borges, Brezillon, Pino, & Pomerol, 2007). Furthermore, lags in exchanging information and incoherent messages can also negatively affect virtual team performance (Andres, 2012).

Clark and Brennan (1991) have identified characteristics that define the type of communication used in non-virtual or distributed settings: copresense (team members are in the same physical location), visibility (team members can see each other), audibility (team members can hear each other), cotemporality (communication occurs in real-time), simultaneity (group members can communicate simultaneously, and sequentiality (team members must contribute in a sequence). With the exception of the first characteristic, copresense, virtual teams can possess any combination of the other five characteristics. These characteristics are inextricably tied to the nature of the technology medium through
which the team communicates. For example, video conferencing will increase visibility and group chat can enable simultaneous communication. Thus, the nature of communication within a virtual team environment can vary greatly, depending on the type of technology that is employed by the team.

The nature of the communication enabled by the selected technology has important implications for virtual teams. Thus, it is crucial to select the appropriate technological medium to facilitate team communication and accomplishment of the team’s task. Technology lends itself to specific interpersonal communication challenges due its inherent communication characteristics discussed above, and teams can enlist certain strategies to combat these challenges. Thus, there are two unique aspects of virtual team member communication: (1) selecting the appropriate technology to facilitate communication about the task and (2) strategies to overcome communication challenges due to technology.

3.2.1 Communication technology medium. A defining feature of a virtual team is its reliance on technology to accomplish an interdependent task. Thus, the selection of the technology medium(s) to be used by the team is a critical decision, and the popular business press suggests 11 best practices to facilitate this decision. These 11 best practices fall into three Level 2 dimensions: media richness, multiple mediums, and other tools. Media richness refers to the extent that the technology medium mimics a face-to-face interaction. The best practices concerning media richness vary from “use the most interactive medium feasible” (high media richness) to use e-mail and phone due to its simplicity, reliability, and accessibility (low media richness). There is consistency among the popular business press, however, on their endorsement to use multiple
communication mediums. Finally, for the Level 2 dimension “other tools”, the press recommends the use of two specific project management tools and to use a tool that takes into account gender and cultural preferences.

Virtual team’s reliance on technology has resulted in a general assumption that virtual teams are inferior to non-virtual teams. The set of communication theories that led to this assumption are known as technology-deterministic or cues-filtered-out theories (e.g., communication theory [Shannon & Weaver, 1949]; social presence theory [Short, Williams, & Christie, 1976]; lack of social context cues hypotheses [Sproull & Kiesler, 1986]), media richness theory [Daft & Lengel, 1984]). Communication theory (Shannon & Weaver, 1949) argues that information loss is minimized by using multiple communication channels and that multiple channels will lead to more effective communication. Social presence theory (Short, Williams, & Christie, 1976) pertains to the underlying psychology mechanisms that are at play when individuals are involved in a communication encounter. Thus, technology-mediated communication lacks nonverbal cues, rendering this form of communication to be perceived as more impersonal, compared to face-to-face communication. Lack of social context cues hypothesis (Sproull & Kiesler, 1986) argues that interactions will be more uninhibited when fewer social context cues are transmitted because of ambiguous social roles and status. Finally, media richness theory (Daft & Lengel, 1985) argues that richer communication channels (e.g., face-to-face communication) are best to use for vague information exchanges while less rich communication channels are better for exchanging less ambiguous information.

These theories are informed by the concept of communication bandwidth, which refers to the number of communication channels that are available in a single
communication medium and the extent of information that can be communicated and understood as a result. Characteristics of the technological medium(s) selected for virtual team communication will determine the extent of its communication bandwidth. For example, videoconferencing most closely mirrors face-to-face interaction and has a large communication bandwidth; however, less than one third of virtual teams report using videoconferencing (Majchrzak, Malhotra, Stamps, & Lipnack, 2004; Purvanova, 2014). The use of multiple forms of technology (increasing the communication bandwidth) is related to better performance and higher member satisfaction (Kayworth & Leidner, 2000).

In order to compare the effects of communication mediums, one of the most commonly used theoretical frameworks is media richness (Daft & Lengel, 1986). A medium high in media richness permits transmitting verbal and nonverbal cues, using natural language, giving immediate feedback, and conveying feelings and emotions. These cues allow team members to better apprehend complex information and messages (Daft & Lengel). Face-to-face is considered the richest communication medium, followed by videoconferencing, telephone, chat, e-mail, and print. Videoconferencing allows team members to view nonverbal cues, such as physical gestures and facial expressions, which contributes to the richness of the medium (Fletcher & Major, 2006). Although videoconferencing and other sophisticated technology is available to virtual teams, teams still mostly rely on e-mail and instant messaging (Hollis, 2005; Penttila, 2005). Arguably, the loss of media richness in communication mediums such as email has its drawbacks, but the asynchronous nature of email does allow individuals to research, formulate, and reflect on their response prior to transmitting the message. The
type of communication medium also has been linked to different types of communication and relationship building. For example, e-mail and instant messaging have been found to demonstrate a positive relationship with combatting potential holes in the network structure; whereas, community based computer-mediated communication (group discussion, video- and audio-conferences) was found to increase the intragroup strength (Orchard & Fullwood, 2010).

The richness of the communication medium chosen for a virtual team has implications for team interactions and performance, and richer media is thought to transmit more information (Daft & Lengel, 1986). However, in one study that compared the effects of different types of communication mediums on process and performance outcomes (Hambley, O’Neill, & Klein, 2007), the authors only found partial support for the media richness theory. The team’s constructive interaction score was higher in teams who only met face-to-face, compared to video-conference and chat teams. However, there was no difference in constructive interaction scores between videoconference and chat teams, and for defensive team interaction and task performance, there was no difference among the three communication mediums. The results also demonstrated that videoconferencing can elicit the same levels of cohesion as meeting exclusively face-to-face. Thus, if a team must rely on technology to communication, using a combination of chat and videoconferencing appears to be a viable alternative to face-to-face communication for short-term problem solving tasks. Using multiple forms of communication mediums can help virtual teams overcome challenges associated with complex tasks (Kock & Lynn, 2012). Although it appears that using multiple communication mediums will increase media richness, most studies have only compared
face-to-face communication with a single type of communication medium (Staples & Webster, 2003). Furthermore, despite the increasing sophistication of technology, virtual team studies are typically focused on traditional types of computer-mediated communication: e-mail, instant messaging, and discussion boards (e.g., Duranti & de Almeida, 2012; Lin, Chiu, Joe, & Tsai, 2010). Fewer studies have focused on newer types of computer-mediated technologies (e.g., social networks, meeting tools).

3.2.2 Effective communication strategies. Reliance on technology to communicate is a hallmark of virtual teams and can create communication challenges for the team (Walvoord, Redden, Elliott, & Coover, 2008). The popular business press has identified a number of tactics to overcome these virtual team communication challenges. These outlets suggest that virtual teams should have a communication plan. In addition, the popular business press recommend best practices concerning the frequency of communication. Similarly to the mixed findings in empirical literature concerning the effect of team virtuality on communication frequency (e.g., Ellemers, De Gilder, & Haslam, 2004; Monge & Contractor, 2003; Webster & Wong, 2008; Weisband, 1992), the popular business press suggests divergent best practices concerning the optimal frequency of communication. Some outlets suggest that communicating less is preferable while others argue that the nature of a virtual environment necessitates more frequent communication.

Technology-mediated communication can have its drawbacks. For example, the use of new technology can negatively influence team performance (Martins et al., 2004). In addition, technology failures can hinder communication, and these technological issues are usually attributed to dispositional factors of the team members (e.g., poor work ethic),
rather than to the situation or technology (Cramton & Orvis, 2003). It has been suggested that the lack of nonverbal and visual cues that are associated with a reliance on technology are related to increased time to make a decision, an inability to make inferences about team members’ knowledge, and failure to anticipate team members’ responses (e.g., Cramton, 2002; Hollingshead, 1998; Sproull & Kielser, 1986).Thus, a team’s reliance on technology has the potential to negatively impact team process (e.g., communication) and a wide variety of important team outcomes.

A reliance on technology for interacting and transmitting information can affect the extent and style of team members’ communication. There are mixed findings for the relationship between team virtuality and amount of communication. A few studies have found no difference in the participation of members in virtual teams and non-virtual teams (e.g., Webster & Wong, 2008; Weisband, 1992); whereas, other studies have found virtual team members to communicate more than non-virtual team members (e.g., Jessup & Tansik, 1991).

Communication frequency is central to a team’s success (Monge & Contractor, 2003; Ellemers, De Gilder, & Haslam, 2004). Communication frequency contributes to more effective performance because it fosters team members’ psychological connection to them, which in turns motivate team members to contribute and assist other team members (Ellemers et al., 2004). Furthermore, the greater extent a team communicates with one another, the more opportunities the team has to develop a collective understanding of the task at hand, which can lead to more effective performance (Monge & Contractor, 2003). In the context of virtual teams, information sharing and effective communication is higher for virtual teams who have a prior history of working together
(Alge, Wiethoff, & Klein, 2003) and are low on virtuality (Mesmer-Magus et al., 2011). One tactic found to improve communication is the use of asynchronous communication because it can encourage communication by allowing members to respond in their own time frame and according to their own schedule (Bikson & Eveland, 1990; Straus, 1996). In regards to communication style, virtual team members contribute lengthier responses and use more formal handovers, compared to non-virtual teams (O’Conaill, Whittaker, & Wilbur, 1993).

The popular business press consistently recommends using multiple communication mediums but diverges on the degree of media richness that is necessary to facilitate effective performance. In addition, the popular business press suggests utilizing a communication plan but differs on how frequently team members should communicate. Although there are mixed recommendations regarding media richness and communication frequency, the majority of the popular business press best practices suggest that a richer media and communicating frequently will lead to positive virtual team outcomes. Thus, the following hypothesis and research question will be investigated:

Hypothesis 2: There will be a positive relationship between all identified virtual team communication best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each communication best practice, (a) multiple communication mediums, (b) a communication medium high in media richness, (c) a communication plan, and (d) frequent communication, will be positively related to important virtual team outcomes (performance, satisfaction, viability).
3.3 Community: Develop Interpersonal Relationships

Communication concerning the task and ensuring that the technology used to communicate fits the task is crucial to virtual team success. However, communication must extend beyond the task in order to enable the development of trust, cohesion, and relationships among group members, which are also crucial for a virtual team to perform effectively. Virtual teams tend to be more task-focused than social focused and generally report weaker relational connections to their teammates, compared to traditional teams (McDonough, Kahn, & Barczak., 2001; Warkentin et al.,1997), heightening the importance of developing interpersonal relationships amongst virtual team members. There are twenty popular business press best practices that pertain to the development of relationships among virtual team members. These best practices were further categorized into five Level 2 dimensions: prioritize relationships, build trust, humanize interactions, informal interactions, and networking. A number of best practices recognize the importance of building relationships among team members and suggest that relationship development needs to be a priority. Consistent with empirical literature, best practices also highlight the necessity to build trust among virtual team members. Finally, three specific tactics to build relationships among team members are suggested, given the unique challenges of operating in a virtual team environment: humanize interactions (e.g., put a picture on your IM profile), utilize informal communication time (e.g., have a virtual “water cooler”), and networking.

Due to a general lack of informal communication, virtual teams tend to be more task-focused than social-focused, impeding the socialization of virtual team members. The task-focus can dissipate over the lifecycle of the team (Chidambaram & Bostrom,
1993; Walther, 1994; Walther & Burgoon, 1992); thus, teams who have a longer lifespan will likely exhibit more informal communication. Informal communication influences the effectiveness of virtual teams, and those who communicate in an informal, social manner are more productive than teams who do not communicate in this manner (Saphiere, 1996). In addition, team viability (belief in future interaction) is more related to the extent of informal communication than the communication medium (Walther, 1994).

Virtual teams rely on technology to interact, which can alter the context of virtual team members’ relationships and elevates the importance of the relationship between technology and trust (Jarvenpaa, Shaw, & Staples, 2004). Thus, the focus of virtual team interpersonal process literature tends to be around building trust among virtual team members (Gilson, Maynard, Young, Vartiainen, & Hakonen, 2015). Trust refers to the “willingness to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party” (Mayer, Davis, & Shoorman, 1995, p. 712) and is related to important affective outcomes such as job satisfaction (Morris, Marshall, & Rainer, 2002) and improved relationships (Sharifi & Pawar, 2002).

Within the context of virtual teams, virtual team members can foster trust through timely responses, communicating openly, and sharing feedback (e.g., Henttonen & Blomqvist, 2005). Recent studies have focused on investigating the link between trust formation within virtual teams and knowledge sharing, transfer, and exchange (e.g., Liu & Li, 2012; Quigley, Tesluk, Locke, & Bartol, 2007). Both trusting other team members and the technology were found to contribute to increased knowledge sharing (Golden &
A lack of knowledge sharing, thus, could be related to lack of trust in others and technology (Breu & Hemingway, 2004).

Researchers have discussed the need for virtual teams to develop trust quickly (swift trust), given that virtual teams often have a shorter life-cycle compared to non-virtual (exclusively face-to-face) teams or are typically assigned a task that is important and urgent (Alge et al., 2003; Jarvenpaa & Leidner, 1999; Kanawattanachai & Yoo, 2002). The swift trust model proposes that team members operate as if trust was already in place and for the rest of the team’s duration, team members will collect evidence that either supports or disproves this assumption of trust (Meyerson, Weick, & Kramer, 1996).

Developing trust in virtual teams can be particularly challenging because often team members have no shared past and no future as a basis to build a relationship trust and have often never met face-to-face (Greenberg, Greenberg, & Antonucci, 2007, Newell, David, & Chand, 2007). Antecedents of trust that have been examined in the virtual team literature are the ability to handle ambiguous tasks and technology (Ratcheva & Vyakarnam, 2001) and time (Walther, 1994; Walther & Burgeon, 1992). The development of trust also depends on the group member’s disposition (e.g., propensity to trust; Aubert & Kelsey, 2003) as well as their perception of other team members’ ability and integrity. However, trust’s relationship with perception of team members’ ability begins to dissipate as teams interact for longer periods of time. A face-to-face meeting in the initial stage of the team’s formation can help with the formation of trust (Suchan & Hayzak, 2001).
It is also important for virtual team members to develop cohesiveness. Cohesiveness is related to important team outcomes, such as greater member satisfaction and more effective communication (Chidambaram, 1996). Task cohesiveness is related to team effectiveness (Gonzalez, Burke, Santuzzi, & Bradley, 2003). However, it has been found that cohesiveness is not related to high quality work when the task is considered simple (Aiello & Kolb, 1995). It has been found that non-virtual teams report higher levels of cohesiveness, compared to virtual teams (Warkentin et al., 1997). Thus, the development of cohesiveness is a particular challenge for virtual teams.

Relationship building can foster feelings of inclusiveness and contribute to the development of cohesion (Powell et al., 2004). McGrath proposed the time-interaction-performance theory in which supportive groups and group well-being are directly related to relationship building within virtual teams (McGrath, 1991). This theory is supported by research within the context of virtual teams. For example, Sawyer and Guinan (1998) found that social process skills (e.g., conflict resolution) were more important than task skills (e.g., technology use) in important virtual team outcomes. Furthermore, in a case study of seven virtual team leaders, one key component to increasing the effectiveness of virtual teams was to prepare for relationship building prior to beginning the project (Pauleen, 2003).

The popular business press emphasizes the importance of building relationships through its suggestion to prioritize building relationships. In addition, the popular press gives specific relationship building tactics (humanizing interactions, informal communication time, or networking) and highlights the necessity to build trust among team members. Thus, the following hypotheses will be tested:
Hypothesis 3: There will be a positive relationship between all identified virtual team *community* best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each community best practice, (a) interpersonal relationship development strategies (e.g., humanizing interactions, informal communication time, networking), (b) prioritization of relationship building will be positively related to virtual team outcomes, and (c) the presence of trust, will be positively related to important virtual team outcomes.

### 3.4 Conflict Management

As previously discussed, virtual team members interact to accomplish a task and develop interpersonal relationships, and these interactions have the potential to result in conflict within teams. It is a well-established finding in the literature that conflict is an important team process and can lead to beneficial outcomes (e.g., identification of more alternatives in decision making; Jehn & Mannix, 2001). However, conflict management must occur in order to render conflict effective. Thus, the identification and management of conflict within a team is crucial to successful team performance, team member satisfaction, and team viability (the likelihood that team members will work together again in the future).

It is suggested that conflict is more likely to occur in virtual teams (e.g., Furumo, 2009). Virtuality has been found to moderate the negative relationship between conflict and team satisfaction, such that as virtuality increases conflict negatively impacts satisfaction to a greater extent (Stark & Bierly, 2009). Despite the empirical literature’s focus on conflict and its management within virtual teams, conflict management has been
identified as a best practice by only one source, which asserts that it is important to “keep conflicts focused on tasks” (Watkins, 2013). Given the mixed findings on virtual teams and task conflict as well as the important caveats to managing conflict within a virtual team, this best practice might be oversimplified.

There are three main types of conflict: relationship (affective), task (cognitive), and process. Task conflict refers to a perception of disagreement among team members about differences in opinions, viewpoints, or ideas pertaining to the team’s task. Examples of task conflict include disagreements over allocation of resources, the approach to accomplish a task, or diverse judgments or interpretations of the task. Research has demonstrated that moderate levels of task conflict can have a positive influence on team performance and have typically been associated with two outcomes: group decision quality (e.g., Fiol, 1994) and affective acceptance of group decisions (e.g., Amason, 1996; Korsgaard, Schweiger, & Sapienza, 1995). However, one meta-analytic investigation of task and relationship conflict in teams found that contrary to the hypothesized positive relationship, there was a strong, negative relationship between task conflict and team performance and team member satisfaction (De Dreu, & Weingart, 2003). Yet, the relationship between task conflict and team performance was mitigated when task conflict and relationship conflict were weakly correlated (De Dreu, & Weingart, 2003). Their results are not definitive evidence that task conflict always hinders performance but highlight important moderators for this relationship (e.g., complexity of the task, level of team trust). The authors also emphasize that it is crucial to understand how teams manage conflict, rather than focus solely on the relationship between the presence of conflict and team outcomes.
Relationship conflict refers to the perception of interpersonal differences among team members and can include annoyance and animosity between team members. Relationship conflict is negatively related to team performance, team member satisfaction, and team vitality (Jehn & Mannix, 2001). Relationship conflict can minimize cooperatively among group members and can shift attention from the task. Meta-analytic results support this, finding a strong, negative relationship between relationship conflict, team performance, and team satisfaction (De Dreu & Weingart, 2003).

Finally, process conflict refers to disagreements on how to accomplish the task or allocate resources (Jehn, 1997). Process conflict has received less attention in the literature, compared to task and relationship conflict; however, initial investigations suggest process conflict can hinder performance by shifting attention away from the task (Griffith et al., 2003).

In comparing virtual to non-virtual teams, conflict has been found to be more common in virtual teams compared to non-virtual teams (e.g., Mortensen & Hinds, 2001). Thus, conflict management will be particularly important for virtual teams. Being skilled at face-to-face communication and conflict management does not necessarily translate to skill in virtual communication and virtual management of conflict, and virtual teams face unique issues which can hinder conflict resolution and management. Thus, the identification, nature, management, and effects of conflict within virtual teams can differ from conflict within non-virtual teams. For example, Armstrong and Cole (2002) found that geographically distributed teams took longer to identify and address conflicts, compared to co-located teams. Two main factors contribute to the differentiation of conflict in virtual teams from conflict in non-virtual teams: geographical distance that
separates team members and the reliance on technology to communicate and accomplish team tasks.

3.4.1 Antecedents of conflict in virtual teams. Geographical distance can have a negative impact on team members’ shared context, familiarity, and friendship, which can lead to increased conflict within teams (Hinds & Bailey, 2003). Geographical distance also increases the heterogeneity within teams. These four factors can be unique challenges to virtual teams and sources of conflict.

3.4.1.1 Shared context. Members of virtual teams operate in different work, geographic, and cultural environments, making it difficult to establish a shared context. Thus, references to particular concepts of interest (Schober, 1998) and orienting to a specific context remains challenging and hinders the development of a mutual understanding. This lack of mutual understanding can lead to task conflict and it can be more difficult to resolve the conflict when there is a differing understanding among team members of the issues faced by the team (Brehmer, 1976). A lack of a shared context also results in varying behavioral norms, and individuals can have different perceptions about appropriate behavior (Kiesler & Cummings, 2002). Armstrong and Cole (2002) found that culture and expectations that were specific to a site served as significant sources of conflict between different locations.

3.4.1.2 Familiarity. Familiarity is associated with less conflict (Deutsch, 1969) and being unfamiliar with team members’ work habits can lead to more problems in coordination (Goodman & Leyden, 1991). The unplanned interactions and conversations that occur among co-located team members increases familiarity (Kraut, Fussell, Brennan, & Seigel, 2002) and gives insight into team members’ personality and work
processes. Distributed team members tend to receive less passive information about their virtual team members, compared to non-virtual teams. This lack of casual visual observation has been found to inhibit learning across geographically distributed sites (Armstrong & Cole, 2002). Thus, it is likely that process conflict will be a greater issue in distributed teams because the team members do not have as many opportunities to become familiar with each other’s personalities and work habits.

3.4.1.3 Friendship. Proximity is related to friendship (Festinger, Schacter, & Bach, 1950) and spontaneous interactions and casual encounters contribute to the ease of establishing a friendship. Thus, rapport building and developing long-term relationships can be difficult in virtual team members (Grinter, Herbsleb, & Perry, 1999). Although high levels of conflict have been found in groups that are friends, friend groups are able to manage conflict more effectively (Mornighan & Conlon, 1991). Given that trust is built through friendship, it is possible that expressing interpersonal conflict is better received among friends.

3.4.1.4 Homogeneity. One of the benefits of virtual teams is the ability leverage the skills of individuals in different geographic locations. However, this distance also can increase the cultural and racial diversity of the team. This heterogeneity has been found to increase task and affective conflict (O’Reilly, Williams, & Barsade, 1997; Pelled, 1996) because of the varying perspectives and work approaches of these diverse individuals.

3.4.2 Conflict management in virtual teams. It is possible that conflict may go undetected for longer in virtual teams compared to those who operate exclusively face-to-face (Griffith et al., 2003), and team members must learn to recognize auditory, rather
than visual, cues of conflict. Virtual team members can often misperceive the type of conflict that they are experiencing (Simons & Peterson, 2000). For example, conflict that is task-related could be taken personally by another team member, which would result in relationship conflict. This misattribution is more likely to occur in newly formed and diverse teams because team members do not have an existing knowledge of their teammates (Gruenfeld, Mannix, Williams, & Neale, 1996). Thus, it is possible that facilitating task conflict in newly formed virtual teams could lead to relationship conflict. This misperception of task conflict as relationship conflict can be mitigated through trust (Simons & Peterson, 2000). Specific forms of trust (competence, integrity, and benevolence) have been found to be associated with constructive levels of task conflict as well as the avoidance of misattributing task conflict as relationship conflict within teams (Mayer et al., 1995).

There have been varied results on the relationship between virtuality and the three specific types of conflict. In one study, distributed teams were found to report more task and interpersonal conflict, compared to co-located teams. However, having a shared identity moderated the effect of geographical distribution on interpersonal conflict and shared context moderated the effect of geographical distribution on task conflict. It appears that spontaneous communication is crucial to developing shared identify and shared context in distributed teams, which facilitates the identification and management of conflict (Hinds & Mortensen, 2005). Conversely, a field study of thirty-five teams conducted by Griffith et al. (2003) found no differences in relationship or task conflict between virtual and traditional teams but did find that virtual teams experienced more process conflict but only when the effects of trust were controlled.
Although, some researchers have found that conflict occurs more in virtual contexts, compared to face-to-face contexts (e.g., Mortensen & Hinds, 2001), there are a number of caveats to this finding. Mortensen and Hinds (2001) found that the perception of a group identity largely reduced group conflict. Technology also plays a role in conflict management. Poole, Holmes, and DeSanctis (1991) found that conflict management was dependent on the team’s ability to adapt to the technology to handle the conflict. A virtual context, due to a higher degree of anonymity, lends itself to uninhibited behavior by team members, compared to teams operating exclusively face-to-face. For example, there is a higher level of swearing, insults, and name-calling in technological-mediated communication, compared to face-to-face (Siegel, Dubrovsky, Kiesler, & McGuire, 1986). Furthermore, there are higher levels of self, rather than group, focus and uninhibited behavior in e-mail messages (Sproull & Kielser, 1986).

The popular business press suggested a single best practice, “keep conflict focused on tasks” and by extension implies that the other two types of conflict, relationship and process, do not lead to positive team outcomes. Thus, the following hypotheses will be tested:

Hypothesis 4: Task conflict (H4a) will be positively related to virtual team outcomes; whereas process conflict (H4b) and interpersonal conflict (H4c) will be negatively related to virtual team outcomes.

3.5 Commitment and Coordination: Emergent and Formal Leadership

Leadership within virtual teams is important to ensure that team interactions, such as conflict management, run smoothly. In non-virtual teams, leadership has a strong impact on team member satisfaction and performance (Bass, 1990; Hackman, 1990).
Leaders facilitate effective and efficient performance by assigning the tasks and activities to the most qualified individuals (McGrath, 1984), clarifying team objectives (Hackman, 1990) and serving as inspiration through providing a vision for the team’s objectives (Conger & Kanungo, 1988).

There is agreement among researchers that virtual teams are more challenging to lead, compared to non-virtual teams (e.g., Bell & Kozlowski, 2002; Duarte & Snyder, 2001; Hinds & Kiesler, 2002; Lipnack & Stamps, 2000). The increased complexities of leading a virtual team are attributed to the lack of face-to-face contact often due to geographical dispersion and the asynchronous communication through technology, which make it more challenging to engage in typical leadership behaviors such as maintaining internal team dynamics and motivating team members (Avolio et al., 2000; Bell & Kozlowski, 2002; Purvanova & Bono, 2009). In addition, strong and effective emergent leadership are likely more necessary in virtual team setting in order to prevent practices that will hinder performance, such as social loafing (Chidambaram & Tung, 2004). Thus, in order for virtual teams and non-virtual teams to function equally, virtual team leaders are required to invest more time and effort, compared to non-virtual team leaders (Purvanova & Bono, 2009).

There are two specific functions of leadership that can enable effective team performance. Team leaders can increase engagement and empowerment among team members as well as create structural supports that can serve as a proxy for leadership in their absence.

3.5.1 Commitment: Engage team members. Transformational leadership and leader-member exchange can increase engagement and empowerment among virtual
team members, leading to important team outcomes. The popular business press highlights this import function of team leaders and recommends eight best practices that fall into four Level 2 dimensions: LMX, empowerment, engagement, and other. Specifically, the press underscores the importance of developing relationships with team members (LMX), empowering virtual team members through meaningful tasks, and engaging team members through eliciting interactions during team meetings and tracking outcomes.

Different types of leadership styles have been examined in virtual teams (e.g., Joshi, Lazarova, & Liao, 2009; Huang, Kahai, & Jestice, 2010; Strang, 2011), and team leadership can either be formal or emergent. Formal leadership is also referred to as hierarchical leadership, in which a leader is formally identified (Ensley, Hmieleski, & Pearce, 2006; Morgeson, DeRue & Karam, 2010; Yukl, 2010). Two theories that support the beneficial outcomes of hierarchical leadership are transformational leadership and leader-member exchange (LMX). Transformational leaders attempt to inspire motivation from their subordinates and encourage them to strive to push beyond their typical performance level (Judge & Piccolo, 2004). Within virtual teams, personality and communication factors contribute to team members perceiving their leader as transformational (Balthazard, Waldman, & Warren, 2009). This leadership style has been found to positive affect important virtual team outcomes (e.g., performance and satisfaction; Purvanova & Bono, 2009) as well as team motivation (Andressen et al., 2012). LMX refers to the quality of the dyadic relationship between the leader and subordinate. Not only do transformational leadership and LMX leadership predict important individual and team performance outcomes (e.g., Fuller, Patterson, Hester, &
Stringer, 1996; Judge & Piccolo, 2004) but these theories are also the approaches that are most widely used in research on virtual teams (e.g., Avolio et al., 2000; Hambley et al., 2007; Howell & Hall-Merenda, 1999; Howell, Neufeld, & Avolio, 2005). Another method that has received less attention but also argued to be an important leadership tactic is supervisory career mentoring (Hoch & Kozlowski, 2012). Research has found, however, that virtuality can attenuate the relationship between these forms of hierarchical leadership and team performance. Shared team leadership (non-hierarchical), on the other hand, was not affected by degree of virtuality (Hoch & Kozlowski, 2012).

The virtual team literature has also attempted to understand the impact that virtuality has on team leadership. Hoch and Kozlowski (2012) discovered that virtuality mitigated the relationship between hierarchical leadership and performance but strengthened the relationship between structural supports and performance. Virtual team members reported greater satisfaction with their team and leader and perceive the leader to be better able to understand messages when the leader is geographically separate from the team (Henderson, 2008). Given some of the unique obstacles that virtual teams face, leadership will continue to play an integral role in the functioning of virtual teams, specifically in the way in which they influence the way a team handles the challenges and adapts in the context of those challenges (Gilson et al., 2015).

Leaders share their leadership with the team membership in order to collectively empower and develop individual team members (Kirkman, Rosen, Tesluk, & Gibson, 2004). Team empowerment is the “increased task motivation that is due to team members’ collective, positive assessments of their organizational tasks (Kirkman et al., 2004, p.174)” and encompasses four dimensions: potency, meaningfulness, autonomy,
and impact. Potency which is the team’s collective belief that it can be generally effective; meaningfulness is team’s attitude towards the task in that it is important and worthwhile; autonomy is a team member’s ability to assert independence and discretion when accomplishing their work, and finally, impact refers to the team members’ beliefs that a task is of importance and value to the organization (Kirkman & Rosen, 1999). Team empowerment has been found to be related to important team outcomes (e.g., process improvement, customer satisfaction; Kirkman et al., 2004).

Given the popular business press recommendations concerning engagement, empowerment and LMX, the following hypothesis will be tested:

Hypothesis 5: There will be a positive relationship between all identified virtual team commitment best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each leadership best practice, (a) engagement, (b) empowerment, and (c) LMX, will be positively related to important virtual team outcomes (performance, satisfaction, viability).

3.5.2 Coordination: Structure work. Structure (e.g., formal work processes and strategies) and establishing shared norms (Sarker, Anjuja, Sarker, & Kirkeby, 2001; Suchan & Hayzak, 2001) are crucial to the success of virtual teams (Lurey & Raisinghani, 2001). The presence of formal and structured processes can facilitate coordination and mitigate process losses, heightening team effectiveness (Rice, Davidson, Dannenhoffer, & Gay, 2007). The popular business press recommends 21 best practices for how to best structure work within a virtual team. These best practices reflect five Level 2 dimensions: expectations, goals, meeting schedule, processes, and
work flow. Each of the Level 2 dimensions reflects specific areas to structure and clarify for virtual team members.

One important function of leadership is to provide structural supports to supplement other leadership practices (Bell & Kozlowski, 2002; Hinds & Kiesler, 2002; Kahai, Sosik, & Avolio, 2003). Structural supports function as a form of indirect influence on the team through affecting the motivation and behavior of team members through structural attributes implanted by the team leader (Bell & Kozlowski, 2002). The use of structural supports is consistent with the substitutes for leadership theory (Kerr & Jermier, 1978), which argues that situational factors may operate as substitutes for leadership.

Maintaining consistency in processes and expectations can result in more efficient performance because shared understanding can allow team members to anticipate the behavior of other team members or the group as a whole (Hinds & Weisband, 2003) as well as enabling more effective ongoing communication (Yates & Orlikowski, 2002). In a virtual team setting, structural supports can stabilize and reduce the ambiguity of operating in a virtual team environment, which can reduce the unpredictability that often characterizes virtual team work (Zaccaro & Bader, 2003; Zigurs, 2003). In addition, given the geographic dispersion or asynchronous communication of virtual team members, structures and routines can serve as an important indirect leadership function and regulate team behavior (Bell & Kozlowski, 2002). Coordination through sharing goals has been linked to improved performance in virtual teams (63, 79).

Given the popular business recommendation to structure the work of a virtual team, the following hypothesis will be tested:
Hypothesis 6: *Structured work* (e.g., clear expectations, goals, meeting schedules, processes, and work flow) will be positively related to important virtual team outcome (performance, satisfaction, and viability).

### 3.6 Contact: Meet Face-to-face

One specific aspect of structuring work that warrants a distinct best practice category is the determination of whether a virtual team will meet face-to-face and if so, determining when and how often these meetings will occur. Given that virtuality has recently been viewed as a continuum rather than a dichotomous distinction of virtual versus face-to-face (e.g., Bell & Kozlowski, 2002; Kirkman & Mathieu, 2005), it is likely that a virtual team will meet face-to-face on one or more occasions. The popular business literature suggests that a face-to-face meeting is essential for the success of a virtual team. However, these sources suggest divergent practices in regards to meeting face-to-face: one recommends that teams have their first meeting be face-to-face and other articles suggests that virtual teams should have a face-to-face early but early does not necessarily have to meet first.

Some researchers believe that periodic face-to-face meetings are critical to virtual team success (Saunders, 2000). In particular, an early face-to-face meeting is related to improvements in a team’s definition and understanding of the project (Ramesh & Dennis, 2002), affective outcomes (e.g., socialization, trust, and respect; Maznevski & Chudoba, 2000; Robey, Khoo, & Powers, 2000; Suchan & Hayzak 2001) and future team performance (Krumpel, 2000; Majchrzak, Rice, King, Malhotra, & Ba, 2000).

Researchers have found that having a face-to-face meeting early in the team’s life cycle, rather than making the initial team meeting face-to-face can improve the benefits
of the first face-to-face meeting because it gives team members the opportunity evaluate other team members based on their task-related experience, rather than a focus on any potential bias a face-to-face interaction might elicit (Maznevski & Chudoba, 2000). Teams also benefit from having repeated face-to-face meetings occur at regular intervals. This allows team members to reserve complex or sensitive issues for face-to-face interactions. Thus, teams who have meetings occurring at a predictable interval have been found to perform better than teams who meet on an as needed” basis (Maznevski & Chudoba, 2000). Meeting face-to-face might be particularly important if the task is ambiguous. Research suggests that FTF meetings are more beneficial for ambiguous tasks; whereas, operating virtually is bettered suited for routine tasks or monitoring progress (Powell et al., 2004).

In addition to the timing of face-to-face meetings, it is also possible that the order of technology-mediated-communication and face-to-face communication influences team outcomes. In particular, the order might affect the participation of minority members of those teams. Research has found that women felt more included when technology-mediated communication was used prior to a face-to-face meeting (Triana, Kirkman, & Wagstaff, 2011) and that members’ perceived inclusion influenced their participation.

Although one popular business press best practices suggests that the first meeting should be face-to-face, the majority of the popular business press suggest that virtual teams should have a face-to-face early in their life cycle but early does not necessarily have to mean first. Due to this inconsistency, the following research question will be investigated:
Research Question 1: Is the order of face-to-face and technologically mediated communication important (e.g., face-to-face first, then technologically mediated communication or technologically mediated communication first, then face-to-face)?

3.7 Cross-cultural Implications: Recognize Similarities and Differences

Coordination through structuring virtual team work and effective communication are two crucial team processes that lead to effective performance outcomes; however, cultural differences of virtual team members have been found to have a negative effect on these processes (Johansson, Dittrich, & Juustila, 1999; Kayworth & Leidner, 2000; Maznevski & Chudoba, 2000; Robey et al., 2000; van Ryssen & Godar, 2000). Thus, it is important to understand and accept cultural differences among team members (Robey et al, 2000; Sarker & Sahay, 2002), and consequently, the awareness of and sensitivity to cross-cultural differences has been cited as a best practice by the popular business press. In addition to recognizing cross-cultural similarities and differences among team members, the popular press also suggests specific strategies to facilitate relationships among members from differing cultures: agree on a shared language and be cognizant of time zone differences.

One of the major advantages of a virtual team is the opportunity to leverage the expertise of individuals across the globe, capitalizing on “just-in-time” talent, constructing global teams of individuals almost instantly (Johnson, Suriya, Yoon, Berrett, & La Fleur, 2002). Despite this flexibility and advantage afforded by virtual teams, there are challenges that go alongside these benefits. The flexibility allows for individuals from varying cultures, personalities, experiences to be brought together to accomplish an interdependent task, which can negatively impact team interactions and performance
outcomes. Thus, these differences, particularly cross-cultural differences, must be recognized, addressed, and managed in order to ensure success in the virtual team.

Culture has been defined as “a collective programming of the mind which distinguishes one category or people from another” (Hofstede, 1980), and one’s culture has an influence on behavior and the way in which an individual interacts with others. In a study of 116,000 IBM employees that represented over 60 countries, Hofstede found that about half of the differences in work-related values could be explained by the employees’ national culture. Thus, national culture is an important determinant of work-related attitudes, values, and behaviors.

There are several studies that specifically examined Hofstede’s (1980) dimensions of national culture. Some cultures expressed interest in using richer media options, such as audio or video-conferencing (e.g., Brazil); whereas, other cultures preferred media that was lower in richness, such as e-mail and instant messaging (e.g., United States). Due to differences in culture, language, and time zones within global virtual teams, the creation of subgroups can be heightened (e.g., O’Leary & Mortensen). These sub-groups have the potential to affect team effectiveness (e.g., Jarman, 2005); however, the empirical work in this area remains limited (Gilson et al., 2015).

Past research recommends that team members should adapt their typical work behaviors in order to foster better cultural interactions (Eearly & Erez, 1997; Hall & Hall, 1989). Despite this recommendation, little research has been conducted which suggest how team members should change their behaviors when working within a multicultural virtual team (Olson & Olson, 2003). As previously discussed, good communication is a crucial component to the success of virtual teams. However, communication within
cross-cultural virtual team can create challenges. When team members from different cultures communicate, their cultural knowledge and background influences these individuals speaking from their own cultural perspective as well as interpreting communication from others from this perspective (Bordyuk, 2003). When cultural similarities and differences in communication styles are not recognized and addressed, these different styles and ways to convey information could negatively impact performance (Abdul-Gader, 1997).

One common dimension of cultural differences and a potential source of cultural misunderstandings among team members is individualistic-collectivism, which reflects the extent to which a society values individual over group membership. Individualistic cultures value autonomy and initiative and often give preference to personal, rather than group goals. Collectivist cultures, on the other hand, value group loyalty, commitment to group norms and activities, and group goals over individual goals (Triandis, 1995). This distinction can contribute to differences in work styles and communication, but possessing knowledge of these potential differences could mitigate the effect they might have on the team’s performance.

Individuals from different cultures can also impact the development of trust. One method of increasing the effectiveness of communication and building trust is to have team members discuss their respective cultures via informal communication at the beginning or end of a phone meeting (Anawait & Craig, 2006). Anawait and Craig (2006) developed a framework of potential areas in which cross-cultural team members can adapt their normal working behaviors in the context of cross-cultural differences to
lead to more effective performance: general, spoken and written, religious beliefs, time zone, face-to-face meeting.

The knowledge, skills, and abilities required to operate successfully in a cross-cultural environment have typically fall under the label intercultural competence, which is “the ability to think and act in interculturally appropriate ways” (Hammer, Bennett, & Wisemann, 2003, p. 422). In a qualitative review of 13 cross-cultural virtual teams, seven key characteristics of cross-cultural teams emerged: communication competence, language competency, understanding of cultural and individual differences, common platform, active listening skills, due diligence check, and speed, transparency, and accuracy of data exchange. Although all of these characteristics are not likely unique to the success of a cross-cultural virtual team, language competency and understanding of cultural differences will likely have an elevated importance in cross-cultural teams, compared to homogeneous virtual teams. The cross-cultural team leaders interviewed for this study identified active listening and cross-cultural experiences as strategies to contribute to the development of understanding of cultural and individual differences (Liu, 2006).

Given differences in culture and the potential implications for organizations, cross-cultural training for virtual teams can be beneficial. Cross-cultural training expands team members’ awareness of cultural differences in norms, values, and language, which is crucial for a team to be successful (Blackburn et al., 2003). One important consideration for virtual teams is deciding and agreeing upon the language to use. Even when there is an agreed-upon language, the words used by individuals from different cultures and their context can differ (Gibson & Zellmer-Bruhn, 2001), thus training is
critical to avoid misunderstandings among team members. There are also differences across cultural in work preferences and values. For example, individuals from the United States are typically more individualistic, and individuals from Asian countries are typically more collectivist. Training can provide a better understanding of cultural differences as well as strategies to manage these differences.

Differences in culture and language can lead to negative impacts on team identification (e.g., Au & Marks, 2012). Team processes are viewed more positively by individuals with a collectivist orientation versus an individualistic orientation (Mockaitis et al., 2012). There are also country differences in team members’ propensity to include others in discussion and decisions. For example, individuals from the United States felt that it was more important to be more inclusive in decisions and discussions, compared to individuals from Belgium, India, and The Netherlands (Dekker, Rutte, & Van den Berg, 2008).

The popular business press highlights the need to be aware of and sensitive to cross-cultural differences among team members. In addition to suggesting the need for a general awareness, two specific tactics are mentioned: agree on a language and be sensitive to time zone differences. Given the specificity of the two tactics, the hypothesis will test the most general hypothesis concerning the importance of being aware of cross-cultural differences among team members.

Hypothesis 7: Cultural Sensitivity will be positively related to important virtual team outcomes (performance, satisfaction, viability).

3.8 Moderators
3.8.1 Team Size. Finally, there is a single best practice concerning team size, recommending that smaller virtual teams are better (less than 10) and that the ideal size for a virtual team is between 4-5 members.

Hypothesis 8: Team size will moderate the best practice-team outcome relationships, such that small teams will enhance the best-practice-team outcome relationship, and medium or large teams will weaken the best practice-team outcome relationship.

3.8.2 Team Outcomes. The most prevalent theoretical framework for examining team effectiveness is the input-process-output (IPO) model (McGrath, 1964). Inputs of teams represent composition and team design characteristics, and team process mediates the relationship between team inputs and desired outcomes. Thus, the best practices detailed above are inputs (e.g., composition) or processes (e.g., conflict management) that are effective methods for achieving desired outcomes.

Team outcomes are results that are valued by the organizations and typically fall into two categories: performance (e.g., productivity, decision-making speed, customer satisfaction) and affective (e.g., member satisfaction; Mathieu, Maynard, Rapp, & Gilson, 2007). Hackman (1987) suggested that in order to provide a comprehensive evaluation of team effectiveness, one must account for current team effectiveness as well as future team effectiveness. One indicator of future team performance is viability, which is defined as team’s “capacity for the sustainability and growth required for success in future performance episodes” (Bell & Marentette, 2011, p.276). Although viability would technically be considered an affective performance outcome, the current study is treating viability as a category distinct from affective outcomes, which is consistent with
previous literature (Bell & Marentette, 2011; Hackman, 1987). Thus, the present study will evaluate three categories of team effectiveness: performance, affective, and viability.

It is likely that the best practices will have differing relationships with the three types of performance outcomes. For example, the best practices that target accomplishing the task (e.g., structure work) are likely to have a stronger relationship with performance outcomes. On the other hand, the best practices that aim to improve the interpersonal relationships among the team members (e.g., socialization) will likely demonstrate a stronger relationship with affective performance outcomes and team viability.

Hypothesis 9: The best practice-outcome relationships will be moderated by the measure of performance (performance, satisfaction, viability), such that the best practices that target accomplishing the task (structured work) will have a stronger relationship with performance outcomes, compared to satisfaction and viability and the best practices that target interpersonal aspects (socialization) will have a stronger relationship with satisfaction and viability, compared to performance.

3.9 The Present Study

The present study sought to meta-analytically test the best practices found in the popular business literature to determine whether these best practices are supported by empirical evidence. Thus, the following hypotheses were tested:

3.8.1 Summary of Study Hypotheses.

Hypothesis 1: There will be a positive relationship between all identified virtual team composition best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each selection best practice, (a) identified virtual
team KSAsOs (b) “Boundary spanning,” (c) team diversity on experience and skills and (d) team member familiarity (with each other), will be positively related to important virtual team outcomes (performance, satisfaction, viability).

Hypothesis 2: There will be a positive relationship between all identified virtual team communication best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each communication best practice, (a) multiple communication mediums, (b) a communication medium high in media richness, (c) a communication plan, and (d) frequent communication, will be positively related to important virtual team outcomes (performance, satisfaction, viability).

Hypothesis 3: There will be a positive relationship between all identified virtual team community best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each community best practice, (a) interpersonal relationship development strategies (e.g., humanizing interactions, informal communication time, networking), (b) prioritization of relationship building will be positively related to virtual team outcomes, and (c) the presence of trust, will be positively related to important virtual team outcomes.

Hypothesis 4: Task conflict (H4a) will be positively related to virtual team outcomes; whereas process conflict (H4b) and interpersonal conflict (H4c) will be negatively related to virtual team outcomes.

Hypothesis 5: There will be a positive relationship between all identified virtual team commitment best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each leadership best practice, (a) engagement,
(b) empowerment, and (c) LMX, will be positively related to important virtual team outcomes (performance, satisfaction, viability).

Hypothesis 6: Structured Work (e.g., clear expectations, goals, meeting schedules, processes, and work flow) will be positively related to important virtual team outcome (performance, satisfaction, and viability).

Research Question 1: Is the order of face-to-face and technologically mediated communication important (e.g., face-to-face first, then technologically mediated communication or technologically mediated communication first, then face-to-face)?

Hypothesis 7: Cultural Sensitivity will be positively related to important virtual team outcomes (performance, satisfaction, viability).

Hypothesis 8: Team size will moderate the best practice-team outcome relationships, such that small teams will enhance the best-practice-team outcome relationship, and medium or large teams will weaken the best practice-team outcome relationship.

Hypothesis 9: The best practice-outcome relationships will be moderated by the measure of performance (performance, satisfaction, viability).
CHAPTER 4: Method

4.1 Literature Review and Inclusion Criteria

The published virtual team literature from 1995-2014 was searched for inclusion in the current meta-analysis. Given the context of the current meta-analysis (virtual teams), it is possible that the sophistication of technology available at the time studies were conducted could significantly influence a study’s results. Thus, articles that were published prior to the year 1995 were excluded from this meta-analysis because 1995 is the year that Windows 95 was introduced, creating substantial shift in the way in which teams operated virtually.

I conducted a search of relevant databases (PsycInfo, ERIC, Business Source Complete, and ABI/INFORM Complete) using keywords combinations or phrases: team OR group AND one of the following words/phrases: virtual, virtuality, virtualness, remote, global, computer-mediated, technology-mediated, distributed, dispersed, decision-making, co-located. I also used these key words/phrases to search conference presentations (Academy of Management, Society for Industrial and Organizational Psychology, International Conference of System Sciences) from the years 2008-2013. In addition, references used in recently published reviews and meta-analyses were manually searched (e.g., Ortiz de Guinea, Webster, & Staples, 2012; Lin, Standing, Liu, 2008; Gilson et al., 2015; Purvanova, 2014). The initial keyword and reference search yielded a large number of articles (2,743). The abstract and method section of each article was reviewed to determine whether the article reported a study investigating virtual teams. This resulted in 955 articles, which were classified as either qualitative (396 articles) or quantitative (559 articles), depending on the article’s method.
All identified quantitative virtual team articles were further reviewed to determine whether it included a study that met the inclusion criteria. For a study to be included in the database, it must have reported an effect size of the relationship between a Level 1 best practice and an outcome (performance, satisfaction, and viability) for a virtual team. Study results that represented a mix of face-to-face and virtual teams were not included. Studies also were included if they did not provide adequate information to calculate the correlation coefficient between these variables at the team level or the sample size for the study (number of teams). Individual-level results for those who performed as a member of the team were not included, as it is not appropriate to mix individual and team levels of analyses for meta-analytic calculations of sample-weighted effect sizes (Gully, Devine, & Whitney, 1995). Finally, only English language articles were included. First authors of all manuscripts for articles that tested a best practices for a virtual team but did not report the correlations between study variables were contacted. The final data set included 51 articles that met the inclusion criteria.

4.2 Coding Procedure

Each study was coded for the following: (a) publication type (b) sample size (c) number of teams (d) study setting (applied versus field) (e) team industry (f) study duration (g) effect size for best practice and team outcome relationship (h) Level 1 category of best practice (i) Level 2 category of best practice (j) description of best practice (k) reliability of predictor (best practice) measure (l) type of predictor reliability measure (m) reliability of criterion (team outcome) measures (n) type of criterion reliability measure.
**4.2.1 Moderators.** Team outcomes were coded for performance if the measure assesses some form of output speed, quality, or productivity (e.g., customer satisfaction, number of ideas generated, decision-making ability), satisfaction if the measure refers to member satisfaction with the team or the task, and viability if outcomes are measured by team commitment or team climate. Average team size was categorized into small (5 members or fewer), medium (6-10 members) and large (above 10 members; Horwitz & Horwitz, 2007).

**4.3 Independence of Data Points**

Given that the focus of the analysis was on best practice dimensions, correlations from the same sample but for different Level 1 and/or Level 2 dimensions were considered independent. However, multiple correlations for the same Level 1 dimension from one sample were considered non-independent and were linearly combined to reflect a single data point for the Level 1 analysis. The same procedure was used for the Level 2 best practice dataset if there were multiple Level 2 best practices from one sample. For the outcome moderator data set, correlations from the same sample were considered independent if the represented a relationship between the best practice and separate performance outcomes. A linear composite was calculated for all dependent correlations.

**4.4 Data Set**

Two datasets were created to test the non-moderated relationships: Level 1 best practices with important virtual team outcomes (85 independent correlations) and Level 2 best practices with important virtual team outcomes (94 independent correlations). Moderators were tested for Level 1 best practices, and two additional datasets were
created: one for team size (85 independent correlations) and one for team outcome (109 independent correlations).

**4.4.1 Outliers.** To test for outliers, I employed Huffcutt and Arthur’s (1995; Arthur et al., 2001) sample-adjusted meta-analytic deviancy (SAMD) statistics approach. I also examined a scree plot (see Appendix B) and evaluated distribution of effects (see Appendix C) to identify potential outliers. From these three methods, seven potential outliers were identified. However, after a thorough review of the study from which each outlier originated, none were considered to be outliers, and thus were not eliminated from the analysis.

**4.5 Statistical Analyses**

A random-effects model meta-analysis of correlations was conducted using Hunter and Schmidt’s (2004) meta-analytic methods and Arthur and colleagues’ (2001) SAS PROC MEANS program. I estimated a sample-weighted mean correlation (SWMr) between the popular business press best practice and team outcomes: overall and by moderators (outcome and team size). I corrected the correlations for statistical artifacts (e.g., sampling error and measurement error) and reported the corrected sample size weighted mean observed correlation ($\rho$). I also calculated the standard deviation of these two correlations as well as the percentage of variability due to sampling error and the percentage of variability due to all corrected artifacts. In addition, I calculated the credibility interval and confidence interval, which serve as indicators of the presence of moderators. Specifically, the 95% confidence interval serves as an indicator of effect size accuracy, and the 95% credibility interval serves as a measure of the presence of
moderators for the tested relationships. Finally, a file-drawer effect (Rosenthal, 1979; Orwin, 1983) is possible, in which potential publication bias might be inflating the relationships between the variables of interest (e.g., the potential for published articles to contain significant relationships; whereas, unpublished work might contain more non-significant relationships). I conducted a file-drawer analysis (Hunter & Schmidt, 2004) to estimate the number of studies reporting non-significant results that would be necessary to include in the meta-analysis to reduce the correlations to less than .10 (i.e., less than a small effect size).

I assessed the identified categorical moderators (performance type and team size) using Hunter and Schmidt’s (2004) subgroup analysis. In this approach, a dataset is created for each moderator and a separate analysis is conducted for the relationships of interests for each moderator. Moderators were likely operating when the mean effect sizes of the overall relationship differed from the mean effect sizes of the subgroups as well as if the standard deviation of the estimate was reduced in the subgroups compared to the standard deviation of the overall (collapsed) category.
CHAPTER 5: Results

5.1 Overall Results

Tables 3-6 contain the meta-analytic results: Table 3 includes the Level 1-virtual team outcome results, Table 4 presents the Level 2-virtual team outcome results, and Tables 5-6 display the moderator results (team size and outcome type, respectively). To interpret the results, Cohen’s (1992) convention of small, medium, large effective sizes (.10, .30, .50, respectively) is used.

5.2 Main Results (Level 1 and Level 2 Best Practices)

5.2.1 Composition: Select Team Members. Hypotheses 1 predicted that there would be a positive relationship between all identified composition best practices and important virtual team outcomes. In support of Hypothesis 1, there was a small, positive relationship between selection best practices and virtual team outcomes ($\rho = .15$) and the 95% confidence interval did not include 0. The credibility interval, however, included zero (95% CV$_L = -.03$), so it is possible that moderators of the relationship exist.

The Level 2 composition best practices hypothesized that (H1a) identified virtual team KSAOs, (H1b) “Boundary spanning”, (H1c) team diversity on experience and skills, and (H1d) team member familiarity would demonstrate a positive relationship with important virtual team outcomes (performance, satisfaction, viability). No studies investigated the relationship between virtual team KSAOs and virtual team outcomes, so H1a was not tested. Hypotheses 1b was not supported, as the relationship between boundary spanning and team outcomes was in the opposite direction as predicted ($r = -.16$); however, this relationship was only investigated by one study.
Team diversity on experience and skills (H1c) was the Level 2 best practice that accounted for the majority of the relationships contributing to the overall selection best practice, but multiple studies also investigated the relationship between team familiarity and virtual team outcomes (H1d). Team familiarity demonstrated a stronger relationship with performance ($\rho = .18$), compared to team diversity on skills and experience ($\rho = .12$), supporting hypotheses 1c and 1d; however, both were small, positive effects. With the exception of boundary spanning, the confidence intervals did not include zero. The credibility interval for team diversity on experience and skills included zero (-.07 to .34); whereas, it did not include zero for team familiarity. The percentage of variance accounted for by correcting for artifacts was 100% for team member familiarity, suggesting that testing for moderators was not necessary. However, this statement is made with caution since the relationship is based on a small number of correlations ($k = 3$).

Overall, the results suggested that taken together selection best practices were related to important virtual team outcomes, supporting hypothesis 1, but moderators were likely operating on this relationship. This finding is not unexpected given the divergent nature of the three Level 2 best practices contributing to the effect (boundary spanning, team diversity on experience and skills, and team familiarity). However, it was surprising that the selection best practices demonstrated the weakest relationship with performance out of all of the Level 1 best practices. Providing support for hypotheses 1c and 1d, team familiarity and diversity on experience and skills were related to enhanced virtual team outcomes, but these effects were small in magnitude.
5.2.2 Communication: Leverage Technology. Hypothesis 2 predicted that there would be an overall positive relationship between all identified virtual team communication best practices and important virtual team outcomes. In support of Hypothesis 2, a medium, positive relationship was observed between communication best practices and virtual team outcomes ($\rho = .32$), and the 95% confidence interval did not include 0. The 95% CV_L was less than zero and less than a quarter of the variance was accounted for by correcting for artifacts (23.25%), so it is possible that there are moderators operating. It is not surprising that moderators are operating given the diverse nature of the Level 2 best practices that are contributing to the overall relationship.

To further examine the communication-virtual team outcome relationship, I tested the following hypotheses for Level 2 best practices: (H2a) multiple communication mediums, (H2b) use of a communication medium high in media richness, (H2c) presence of a communication plan, and (H2d) frequent communication would demonstrate a positive relationship with important virtual team outcomes.

Twenty studies investigated the relationships between the Level 2 best practices and virtual team outcomes. The use of multiple communication mediums constituted 3 out of the 20 (15%) correlations, media richness accounted for 9 out of the 20 (45%), and communication frequency for 8 out of the 20 (40%). There was no relationship between multiple communication mediums and virtual team outcomes ($\rho = .06$). Furthermore, the confidence interval for this relationship included zero; thus, H2a was not supported. The Media richness (H2b) and communication frequency (H2d) demonstrated medium, positive relationships with virtual team outcomes ($\rho = .44$ and $\rho = .44$, respectively); however, confidence intervals did not equal zero. Thus, hypotheses 2b and 2d were
supported. The 95% credibility interval did not include zero media richness but did for communication frequency. In addition, there is a large amount of variance that remains unexplained after correcting for artifacts; thus, further investigation is warranted into these relationships to determine if moderators are operating. No studies investigated relationship between the presence of a communication plan and a virtual team outcome (H2c), so this relationship was not tested.

In support of Hypotheses 2, the results suggest that communication best practices taken together are related to positive virtual team outcomes. Two Level 2 communication best practices, media richness and communication frequency, were similarly related to positive virtual team outcome. The third Level 2 communication best practice, use multiple communication mediums, was related to enhanced virtual team outcomes, but demonstrated a weaker relationship with these outcomes, compared to the other Level 2 communication best practices.

5.2.3 Community: Develop Interpersonal Relationships. Hypothesis 3 proposed that there would be an overall positive relationship between virtual team community best practices and important virtual team outcomes. In support of the hypothesis, there was a medium, positive relationship between community best practices and virtual team outcomes ($\rho = .45$). Both the 95% confidence and credibility intervals did not include zero.

To better understand the community-virtual team outcome relationship, the relationships between the Level 2 best practices, (H3a) interpersonal relationship development strategies (e.g., humanizing interactions, informal communication time, networking), (H3b) prioritization of relationship building, and (H3c) the presence of trust,
and important virtual team outcomes were tested. Trust accounted for the majority of the Level 2 best practice-virtual team outcome relationships (85%). The use of interpersonal relationship development strategies accounted for the remaining 15% of the relationships for Level 2 community best practices. Prioritization of relationships-virtual team outcomes relationship was not evaluated in any studies, so this relationship (H3b) was not tested. Both interpersonal relationship development (H3a) and trust (H3c) demonstrated a medium, positive relationship with virtual team outcomes ($\rho = .48$ and $\rho = .47$, respectively) and the 95% confidence intervals did not include zero, providing support for hypotheses 3a and 3c. The 95% CVL was .06 for interpersonal relationship development and -.02 for trust. In addition, there was still a large amount of variance unexplained after correcting for statistical artifacts, highlighting the need to further test whether moderators are operating.

Overall, the results suggest that community best practices are related to positive virtual team outcomes. The two Level 2 best practices contributing to the overall effect, interpersonal relationship development and trust, demonstrated essentially the same relationship with virtual team outcomes. However, there are wide credibility intervals for these two relationships, suggesting that there may be subpopulations present.

**5.2.4 Conflict Management.** Although Hypothesis 4 was predicted at Best Practice Level 2, *Task conflict* (H4a) will be positively related to virtual team outcomes; whereas *process conflict* (H4b) and *interpersonal conflict* (H4c) will be negatively related to virtual team outcomes, an overall effect size for the conflict-virtual team outcome was calculated. To calculate the effect size, process conflict and interpersonal conflict were reverse coded to obtain an aggregate correlation that is consistent with the
hypotheses. The results suggested a small, negative relationship between conflict and 
virtual team outcomes ($\rho = -.21$). The 95% confidence and credibility intervals do not 
include zero, but these results are interpreted with caution due the size of k and level of 
analysis.

For the Level 2 conflict best practices, the relationship between task conflict and 
virtual team outcomes was in the opposite direction as predicted ($\rho = -.32$); thus, 
hypothesis H4a was not supported. The relationships between process and interpersonal 
conflict with virtual team outcomes were in the predicted direction for both relationships. 
Process conflict demonstrated a medium, negative relationship with virtual team 
outcomes ($\rho = -.40$), and interpersonal conflict also demonstrate a relationship with 
virtual team outcomes ($\rho = -.34$). Thus, hypotheses H4b and H4c were supported.

The results suggested that the presence of the three types of conflict, task, process, 
and interpersonal, is related to decrements in important virtual team outcomes. The 
finding for task conflict was unexpected; however, the negative relationship between the 
other two types of conflict (process and interpersonal) with virtual team outcomes was 
not. Although there are a small number of correlations contributing to these 
relationships, the meta-analytic results suggest that moderators are not operating on these 
relationships.

5.2.5 Commitment (Leadership). The results supported Hypothesis 5, which 
predicted a positive relationship between virtual team commitment best practices and 
important virtual team outcomes, finding a medium, positive relationship between 
leadership best practices and virtual team outcomes ($\rho = .37$). The confidence interval
did not include zero; however, \( k \) was less than 10 and the 95\% CV \( L \) was less than zero, so the results will be interpreted with caution.

The Level 2 leadership best practices, (H5a) engagement, (H5b) empowerment, (H5c) and LMX, and important virtual team outcomes, demonstrated a medium, positive relationship with performance \((\rho = .42, \rho = .34, \rho = .37, \text{respectively})\), supporting Hypotheses 5a-5c. The confidence intervals did not include zero; however, the credibility interval included zero for empowerment and engagement, raising the possibility that moderators might still be operating on these relationships and need to be tested further.

The results indicate that leadership best practices are related to positive virtual team outcomes, providing support for hypothesis 5. The three specific Level 2 best practices demonstrated similar relationships with virtual team outcomes; however, there credibility interval for two of these Level 2 best practices, empowerment and LMX, was wide, suggesting the presence of moderators.

5.2.6 Coordination. Hypothesis 6 predicted that structured work (e.g., clear expectations, goals, meeting schedules, processes, and work flow) would be positively related to important virtual team outcome. There was a medium, positive relationship between structured work and virtual team outcomes \((\rho = .40)\), and the confidence and credibility intervals did not include zero. After correcting for statistical artifacts, 51\% of the variance was explained. Thus, leveraging best practices that facilitate the structuring of work in virtual teams leads to enhanced virtual team outcomes.

5.2.7 Contact and Cross-cultural Implications. Research Question 1 asked whether the order of face-to-face and technologically mediated communication important
(e.g., face-to-face first, then technologically mediated communication or technologically mediated communication first, then face-to-face) would influence virtual team performance. No effect size was calculated because no studies directly tested this research question.

Hypotheses 7 predicted that cultural sensitivity would be positively related to important virtual team outcomes; however, only one study tested this relationship in virtual teams. The study found a small, positive relationship between cultural sensitivity and virtual team outcomes \( r = .12 \); however, the confidence interval included zero. Thus, hypothesis 7 was not supported.

5.3 Moderators

5.3.1 Team Size. Hypothesis 8, which predicted that team size would moderate the best practice-team outcome relationships, such that small teams will enhance the best-practice-team outcome relationship, and medium or large teams will weaken the best practice-team outcome relationship, was partially supported. The majority of the studies used small teams (52%), with fewer studies using medium (25%) and large teams (19%). Four studies did not report the team size, so these studies were not included in the moderator analysis.

For the overall best practice-virtual team outcome relationship, the relationships between the best practices and outcomes for both small and large teams were stronger, compared to medium sized teams. This pattern held across all Level 1 best practices (with the exception of conflict and communication); however, these results are interpreted with caution due to relatively small number of studies that are contributing to the relationship. The confidence interval did not include zero for each of these
moderated relationships, with the exception of Selection-Outcome (large teams only); conflict (medium and large teams); communication (medium teams only). For communication, the relationship for small and medium teams was stronger, compared to large teams; however, the direction of the relationship for medium teams was in the opposite direction ($\rho = -.17$, compared to the other team sizes ($\rho = .54$ and $\rho = .15$ for small and large teams, respectively).

The moderator results suggest that small and large teams benefit more from virtual team best practices, compared to medium teams, as the relationships between small and large teams were consistently larger than the relationships between the best practices and virtual team outcomes for medium sized teams.

### 5.3.2 Performance Type.

Hypothesis 9 predicted that the best practice-outcome relationships would be moderated by the measure of team outcome (performance, satisfaction, viability). 109 independent correlations were found ($N = 6611$ teams) between a Level 1 Best Practice and a team outcome measure. Performance was used as the team outcome measure for 80 of the relationships (73%), satisfaction for twenty-seven (25%), and viability for two (2%). For all Level 1 best practices, the best practice-satisfaction relationship was stronger than the best practice-performance relationship. Community best practices demonstrate the largest difference in effect sizes between performance and satisfaction (.33 versus .77); selection displayed the smallest difference (.12 versus .21). With the exception of the conflict-performance relationship, none of the confidence intervals included zero. Although best practices generally demonstrate a positive relationship with virtual team outcomes, the moderator analysis suggest that best
practices are more likely to increase virtual team members’ satisfaction, compared to performance outcomes.
Table 3
Meta-analytic results for Level 1 Best Practices and Important Virtual Team Outcomes

<table>
<thead>
<tr>
<th>Level 1 Best Practice</th>
<th>$k$</th>
<th>$N$</th>
<th>$\text{SWM}_{r}$</th>
<th>$\text{SD}_{\text{SWM}}$</th>
<th>$%\text{SEV}$</th>
<th>$95% \text{ CI}$</th>
<th>$\rho$</th>
<th>$\text{SD}_{\rho}$</th>
<th>$%\text{ARTV}$</th>
<th>95% CV</th>
<th>$\text{FD}_k$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>85</td>
<td>5329</td>
<td>.27</td>
<td>.25</td>
<td>22.34</td>
<td>.25</td>
<td>.30</td>
<td>.32</td>
<td>.25</td>
<td>22.88</td>
<td>-.18 .81</td>
</tr>
<tr>
<td>Composition</td>
<td>10</td>
<td>848</td>
<td>.13</td>
<td>.13</td>
<td>64.90</td>
<td>.06</td>
<td>.19</td>
<td>.15</td>
<td>.09</td>
<td>65.18</td>
<td>-.03 .33</td>
</tr>
<tr>
<td>Communication</td>
<td>21</td>
<td>1175</td>
<td>.26</td>
<td>.26</td>
<td>22.86</td>
<td>.21</td>
<td>.31</td>
<td>.32</td>
<td>.28</td>
<td>23.25</td>
<td>-.23 .87</td>
</tr>
<tr>
<td>Community</td>
<td>27</td>
<td>1441</td>
<td>.39</td>
<td>.23</td>
<td>26.42</td>
<td>.34</td>
<td>.43</td>
<td>.45</td>
<td>.23</td>
<td>27.84</td>
<td>.01 .89</td>
</tr>
<tr>
<td>Conflict</td>
<td>6</td>
<td>279</td>
<td>-.18</td>
<td>.19</td>
<td>55.60</td>
<td>-.29</td>
<td>-.06</td>
<td>-.21</td>
<td>.15</td>
<td>55.94</td>
<td>-.51 .09</td>
</tr>
<tr>
<td>Commitment</td>
<td>9</td>
<td>662</td>
<td>.33</td>
<td>.21</td>
<td>25.31</td>
<td>.26</td>
<td>.40</td>
<td>.37</td>
<td>.20</td>
<td>25.81</td>
<td>-.03 .76</td>
</tr>
<tr>
<td>Coordination</td>
<td>11</td>
<td>891</td>
<td>.35</td>
<td>.14</td>
<td>47.71</td>
<td>.29</td>
<td>.41</td>
<td>.40</td>
<td>.12</td>
<td>50.57</td>
<td>.17 .62</td>
</tr>
<tr>
<td>Face-to-face Contact</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Cross-cultural Implications</td>
<td>1</td>
<td>98</td>
<td>.12</td>
<td>0</td>
<td>-.08</td>
<td>.32</td>
<td>.15</td>
<td>0</td>
<td>.15</td>
<td>.15</td>
<td>0</td>
</tr>
</tbody>
</table>

$k = \text{total number of correlations included in the meta-analysis}; N = \text{total number of teams}; \text{SWM}_{r} = \text{sample size weighted mean observed correlation}; \text{SD}_{\text{SWM}} = \text{standard deviation of sample size weighted mean observed correlation}; \%\text{SEV} = \text{percentage of the variance due to sampling error}; 95\% \text{ CI} = 95\% \text{ confidence interval around } \rho; \rho = \text{corrected sample size weighted mean observed correlation}; \text{SD}_{\rho} = \text{standard deviation of corrected sample size weighted mean observed correlation}; \%\text{ARTV} = \text{percentage of the variance due to all corrected artifacts}; 95\% \text{ CV} = 95\% \text{ credibility interval around } \rho; \text{FD}_k = \text{number of unpublished/unreported studies reporting null findings needed to reduce } \rho \text{ to }.10.$
<table>
<thead>
<tr>
<th>Best Practice</th>
<th>k</th>
<th>N</th>
<th>SWMr</th>
<th>SD_{SWMr}</th>
<th>%</th>
<th>95% CI</th>
<th>ρ</th>
<th>SD</th>
<th>%</th>
<th>95% CV</th>
<th>FD_{k}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>94</td>
<td>5863</td>
<td>.24</td>
<td>.27</td>
<td>19.66</td>
<td>.22</td>
<td>.27</td>
<td>.29</td>
<td>.29</td>
<td>20.52</td>
<td>-27.12</td>
</tr>
<tr>
<td>Composition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KSAOs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>boundary spanning</td>
<td></td>
<td></td>
<td></td>
<td>.16</td>
<td>0</td>
<td>-1.00</td>
<td>.19</td>
<td>.08</td>
<td>.22</td>
<td>-1.19</td>
<td>-1.19</td>
</tr>
<tr>
<td>team diversity on experience and skills</td>
<td>8</td>
<td>789</td>
<td>.12</td>
<td>.13</td>
<td>56.65</td>
<td>.06</td>
<td>.18</td>
<td>.14</td>
<td>.10</td>
<td>56.82</td>
<td>-0.07</td>
</tr>
<tr>
<td>team familiarity</td>
<td>3</td>
<td>130</td>
<td>.18</td>
<td>.10</td>
<td>100.00</td>
<td>.01</td>
<td>.21</td>
<td>0</td>
<td>100.00</td>
<td>.21</td>
<td>.21</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>communication mediums</td>
<td>3</td>
<td>353</td>
<td>.05</td>
<td>.12</td>
<td>59.55</td>
<td>-.06</td>
<td>.15</td>
<td>.06</td>
<td>.09</td>
<td>59.58</td>
<td>-1.12</td>
</tr>
<tr>
<td>media richness</td>
<td>9</td>
<td>404</td>
<td>.37</td>
<td>.20</td>
<td>40.84</td>
<td>.28</td>
<td>.45</td>
<td>.44</td>
<td>.19</td>
<td>41.55</td>
<td>.07</td>
</tr>
<tr>
<td>communication plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>communication frequency</td>
<td>9</td>
<td>453</td>
<td>.33</td>
<td>.28</td>
<td>19.71</td>
<td>.25</td>
<td>.42</td>
<td>.44</td>
<td>.33</td>
<td>19.74</td>
<td>-2.22</td>
</tr>
<tr>
<td>Community</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>interpersonal relationship development</td>
<td>4</td>
<td>304</td>
<td>.40</td>
<td>.20</td>
<td>22.82</td>
<td>.31</td>
<td>.50</td>
<td>.48</td>
<td>.21</td>
<td>23.68</td>
<td>.06</td>
</tr>
<tr>
<td>prioritization of relationships</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>trust</td>
<td>23</td>
<td>1137</td>
<td>.39</td>
<td>.24</td>
<td>25.35</td>
<td>.34</td>
<td>.44</td>
<td>.47</td>
<td>.25</td>
<td>25.90</td>
<td>-0.2</td>
</tr>
<tr>
<td>Conflict</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>task</td>
<td>5</td>
<td>183</td>
<td>-.27</td>
<td>.11</td>
<td>100.00</td>
<td>-.41</td>
<td>-.14</td>
<td>-.32</td>
<td>0</td>
<td>100.00</td>
<td>-32.02</td>
</tr>
<tr>
<td>process</td>
<td>3</td>
<td>121</td>
<td>-.33</td>
<td>.12</td>
<td>100.00</td>
<td>-.49</td>
<td>-.17</td>
<td>-.40</td>
<td>0</td>
<td>100.00</td>
<td>-40.06</td>
</tr>
<tr>
<td>interpersonal</td>
<td>2</td>
<td>73</td>
<td>-.29</td>
<td>.05</td>
<td>100.00</td>
<td>-.50</td>
<td>-.07</td>
<td>-.34</td>
<td>0</td>
<td>100.00</td>
<td>-34.24</td>
</tr>
<tr>
<td>Commitment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>engagement</td>
<td>3</td>
<td>208</td>
<td>.35</td>
<td>.16</td>
<td>44.01</td>
<td>.23</td>
<td>.47</td>
<td>.42</td>
<td>.14</td>
<td>45.08</td>
<td>.14</td>
</tr>
<tr>
<td>empowerment</td>
<td>6</td>
<td>454</td>
<td>.29</td>
<td>.26</td>
<td>16.53</td>
<td>.20</td>
<td>.37</td>
<td>.34</td>
<td>.28</td>
<td>16.79</td>
<td>-2.22</td>
</tr>
<tr>
<td>LMX</td>
<td>2</td>
<td>162</td>
<td>.31</td>
<td>.23</td>
<td>18.86</td>
<td>.17</td>
<td>.45</td>
<td>.37</td>
<td>.25</td>
<td>19.26</td>
<td>-1.2</td>
</tr>
<tr>
<td>Coordination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>891</td>
<td>.35</td>
<td>.14</td>
<td>47.71</td>
<td>.29</td>
<td>.41</td>
<td>.40</td>
<td>.11</td>
<td>50.57</td>
<td>.17</td>
</tr>
<tr>
<td>Face-to-face Contact</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>----------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Cross-cultural Implications</td>
<td>1</td>
<td>98</td>
<td>.12</td>
<td>0</td>
<td>.</td>
<td>-.08</td>
<td>.32</td>
<td>.15</td>
<td>0</td>
<td>.</td>
<td>.15</td>
</tr>
</tbody>
</table>

KSAOs = virtual team knowledge, skills, abilities, and other characteristics; LMX = leader-member exchange; FTF = face-to-face; $k$ = total number of correlations included in the meta-analysis; $N$ = total number of teams; $SWM_r$ = sample size weighted mean observed correlation; $SD_{SWM_r}$ = standard deviation of sample size weighted mean observed correlation; $\%SEV$ = percentage of the variance due to sampling error; 95% CI = 95% confidence interval around $\rho$; $\rho$ = corrected sample size weighted mean observed correlation; $SD_{\rho}$ = standard deviation of corrected sample size weighted mean observed correlation; $\%ARTV$ = percentage of the variance due to all corrected artifacts; 95% CV = 95% credibility interval around $\rho$; $FD_k$ = number of unpublished/unreported studies reporting null findings needed to reduce $\rho$ to .10.
<table>
<thead>
<tr>
<th>Level 1 Best Practice</th>
<th>$k$</th>
<th>$N$</th>
<th>SWMr</th>
<th>SD_{SWMr}</th>
<th>% SEV</th>
<th>95% CI</th>
<th>$\rho$</th>
<th>SD $\rho$</th>
<th>% ARTV</th>
<th>95% CV</th>
<th>FDk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>85</td>
<td>5329.27</td>
<td>.25</td>
<td>22.34</td>
<td>.25</td>
<td>.30</td>
<td>.32</td>
<td>.25</td>
<td>22.88</td>
<td>-20</td>
<td>.81</td>
</tr>
<tr>
<td>Small</td>
<td>44</td>
<td>2361.32</td>
<td>.25</td>
<td>25.29</td>
<td>.28</td>
<td>.36</td>
<td>.37</td>
<td>.25</td>
<td>26.04</td>
<td>-10</td>
<td>.85</td>
</tr>
<tr>
<td>Medium</td>
<td>21</td>
<td>1351.13</td>
<td>.19</td>
<td>41.14</td>
<td>.07</td>
<td>.18</td>
<td>.15</td>
<td>.18</td>
<td>41.35</td>
<td>-20</td>
<td>.49</td>
</tr>
<tr>
<td>Large</td>
<td>16</td>
<td>1418.28</td>
<td>.23</td>
<td>18.35</td>
<td>.23</td>
<td>.33</td>
<td>.33</td>
<td>.25</td>
<td>19.11</td>
<td>-20</td>
<td>.82</td>
</tr>
<tr>
<td>Composition</td>
<td>10</td>
<td>848 .13</td>
<td>.13</td>
<td>64.90</td>
<td>.06</td>
<td>.19</td>
<td>.15</td>
<td>.09</td>
<td>65.18</td>
<td>-0.03</td>
<td>.33</td>
</tr>
<tr>
<td>Small</td>
<td>5</td>
<td>290 .18</td>
<td>.19</td>
<td>46.88</td>
<td>.07</td>
<td>.29</td>
<td>.21</td>
<td>.16</td>
<td>47.20</td>
<td>-10</td>
<td>.53</td>
</tr>
<tr>
<td>Medium</td>
<td>3</td>
<td>414 .09</td>
<td>.06</td>
<td>100.00</td>
<td>.00</td>
<td>.19</td>
<td>.0</td>
<td>0</td>
<td>. .</td>
<td>. .</td>
<td>.</td>
</tr>
<tr>
<td>Large</td>
<td>2</td>
<td>144 .11</td>
<td>.12</td>
<td>93.68</td>
<td>-0.05</td>
<td>.28</td>
<td>.</td>
<td>0</td>
<td>. .</td>
<td>. .</td>
<td>0</td>
</tr>
<tr>
<td>Communication</td>
<td>21</td>
<td>1175 .26</td>
<td>.26</td>
<td>22.86</td>
<td>.21</td>
<td>.31</td>
<td>.32</td>
<td>.28</td>
<td>23.25</td>
<td>-20</td>
<td>.87</td>
</tr>
<tr>
<td>Small</td>
<td>12</td>
<td>670 .42</td>
<td>.16</td>
<td>47.76</td>
<td>.35</td>
<td>.48</td>
<td>.54</td>
<td>.15</td>
<td>49.29</td>
<td>.25</td>
<td>.83</td>
</tr>
<tr>
<td>Medium</td>
<td>5</td>
<td>133</td>
<td>-1.15</td>
<td>.33</td>
<td>34.09</td>
<td>-0.32</td>
<td>.02</td>
<td>-17</td>
<td>.30</td>
<td>34.13</td>
<td>-80</td>
</tr>
<tr>
<td>Large</td>
<td>4</td>
<td>372</td>
<td>.12</td>
<td>.10</td>
<td>100.00</td>
<td>.02</td>
<td>.22</td>
<td>.15</td>
<td>0</td>
<td>100.00</td>
<td>.15</td>
</tr>
<tr>
<td>Community</td>
<td>27</td>
<td>1441</td>
<td>.39</td>
<td>.23</td>
<td>26.42</td>
<td>.34</td>
<td>.43</td>
<td>.45</td>
<td>.23</td>
<td>27.84</td>
<td>.01</td>
</tr>
<tr>
<td>Small</td>
<td>16</td>
<td>833</td>
<td>.37</td>
<td>.24</td>
<td>26.59</td>
<td>.31</td>
<td>.42</td>
<td>.41</td>
<td>.23</td>
<td>27.40</td>
<td>-0.03</td>
</tr>
<tr>
<td>Medium</td>
<td>6</td>
<td>264</td>
<td>.26</td>
<td>.14</td>
<td>100.00</td>
<td>.14</td>
<td>.37</td>
<td>.32</td>
<td>0</td>
<td>100.00</td>
<td>.32</td>
</tr>
<tr>
<td>Large</td>
<td>3</td>
<td>202</td>
<td>.57</td>
<td>.12</td>
<td>50.62</td>
<td>.48</td>
<td>.67</td>
<td>.68</td>
<td>.10</td>
<td>50.98</td>
<td>.49</td>
</tr>
<tr>
<td>Conflict</td>
<td>6</td>
<td>279</td>
<td>-1.18</td>
<td>.19</td>
<td>55.60</td>
<td>-0.29</td>
<td>-0.06</td>
<td>-21</td>
<td>.15</td>
<td>55.94</td>
<td>-51</td>
</tr>
<tr>
<td>Small</td>
<td>4</td>
<td>158</td>
<td>-1.17</td>
<td>.25</td>
<td>39.11</td>
<td>-0.33</td>
<td>-0.02</td>
<td>-21</td>
<td>.23</td>
<td>39.23</td>
<td>-66</td>
</tr>
<tr>
<td>Medium</td>
<td>1</td>
<td>23</td>
<td>-3.1</td>
<td>.</td>
<td>- .</td>
<td>- .</td>
<td>- .</td>
<td>- .</td>
<td>0</td>
<td>- .</td>
<td>- .</td>
</tr>
<tr>
<td>Large</td>
<td>1</td>
<td>98</td>
<td>-1.15</td>
<td>0</td>
<td>.</td>
<td>- .</td>
<td>- .</td>
<td>- .</td>
<td>0</td>
<td>- .</td>
<td>- .</td>
</tr>
<tr>
<td>Commitment</td>
<td>9</td>
<td>662</td>
<td>.33</td>
<td>.21</td>
<td>25.31</td>
<td>.26</td>
<td>.40</td>
<td>.37</td>
<td>.20</td>
<td>25.81</td>
<td>-0.03</td>
</tr>
<tr>
<td>Small</td>
<td>2</td>
<td>167</td>
<td>.35</td>
<td>.11</td>
<td>79.35</td>
<td>.21</td>
<td>.48</td>
<td>.</td>
<td>0</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Medium</td>
<td>3</td>
<td>232</td>
<td>.15</td>
<td>.15</td>
<td>58.20</td>
<td>.02</td>
<td>.27</td>
<td>.16</td>
<td>.11</td>
<td>58.34</td>
<td>-0.05</td>
</tr>
<tr>
<td>Large</td>
<td>3</td>
<td>202</td>
<td>.40</td>
<td>.11</td>
<td>87.56</td>
<td>.29</td>
<td>.52</td>
<td>.46</td>
<td>.04</td>
<td>88.39</td>
<td>.37</td>
</tr>
<tr>
<td>Coordination</td>
<td>11</td>
<td>891</td>
<td>.35</td>
<td>.14</td>
<td>47.71</td>
<td>.29</td>
<td>.41</td>
<td>.40</td>
<td>.11</td>
<td>50.57</td>
<td>.17</td>
</tr>
<tr>
<td>Small</td>
<td>5</td>
<td>243</td>
<td>.38</td>
<td>.13</td>
<td>91.90</td>
<td>.27</td>
<td>.49</td>
<td>.42</td>
<td>.03</td>
<td>94.34</td>
<td>.35</td>
</tr>
<tr>
<td>Medium</td>
<td>3</td>
<td>285</td>
<td>.20</td>
<td>.11</td>
<td>86.72</td>
<td>.09</td>
<td>.31</td>
<td>.25</td>
<td>.05</td>
<td>87.86</td>
<td>.16</td>
</tr>
<tr>
<td>Large</td>
<td>2</td>
<td>302</td>
<td>.46</td>
<td>.04</td>
<td>100.00</td>
<td>.37</td>
<td>.55</td>
<td>.54</td>
<td>0</td>
<td>100.00</td>
<td>.54</td>
</tr>
<tr>
<td>Cross-cultural Implications</td>
<td>1</td>
<td>98</td>
<td>.12</td>
<td>0</td>
<td>.</td>
<td>-0.08</td>
<td>0.32</td>
<td>0.15</td>
<td>0</td>
<td>.</td>
<td>0.15</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---</td>
<td>----</td>
<td>-----</td>
<td>---</td>
<td>---</td>
<td>-------</td>
<td>------</td>
<td>------</td>
<td>---</td>
<td>---</td>
<td>------</td>
</tr>
<tr>
<td>Small</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Medium</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Large</td>
<td>1</td>
<td>98</td>
<td>.12</td>
<td>0</td>
<td>.</td>
<td>-0.08</td>
<td>0.32</td>
<td>0.15</td>
<td>0</td>
<td>.</td>
<td>0.15</td>
</tr>
</tbody>
</table>

$k = \text{total number of correlations included in the meta-analysis}; \ N = \text{total number of teams}; \ SWMr = \text{sample size weighted mean observed correlation}; \ SD_{SWMr} = \text{standard deviation of sample size weighted mean observed correlation}; \ %\text{SEV} = \text{percentage of the variance due to sampling error}; \ 95\% \ CI = 95\% \text{ confidence interval around } \rho; \ \rho = \text{corrected sample size weighted mean observed correlation}; \ SD_{\rho} = \text{standard deviation of corrected sample size weighted mean observed correlation}; \ %\text{ARTV} = \text{percentage of the variance due to all corrected artifacts}; \ 95\% \ CV = 95\% \text{ credibility interval around } \rho; \ FD_k = \text{number of unpublished/unreported studies reporting null findings needed to reduce } \rho \text{ to } .10.$
<table>
<thead>
<tr>
<th>Best Practice</th>
<th>$k$</th>
<th>$N$</th>
<th>SWMr</th>
<th>SD_{SWMr}</th>
<th>% SEV</th>
<th>95% CI</th>
<th>$\rho$</th>
<th>SD $\rho$</th>
<th>% ARTV</th>
<th>95% CV</th>
<th>FD$_k$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>109</td>
<td>6611</td>
<td>.29</td>
<td>.26</td>
<td>21.57</td>
<td>.27</td>
<td>.31</td>
<td>.34</td>
<td>.26</td>
<td>22.16</td>
<td>-.18</td>
</tr>
<tr>
<td>Composition</td>
<td>13</td>
<td>1114</td>
<td>.14</td>
<td>.12</td>
<td>80.09</td>
<td>.08</td>
<td>.20</td>
<td>.16</td>
<td>.06</td>
<td>80.53</td>
<td>.04</td>
</tr>
<tr>
<td>Performance</td>
<td>10</td>
<td>848</td>
<td>.12</td>
<td>.12</td>
<td>76.61</td>
<td>.05</td>
<td>.18</td>
<td>.14</td>
<td>.07</td>
<td>76.89</td>
<td>.00</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>3</td>
<td>266</td>
<td>.21</td>
<td>.07</td>
<td>100.00</td>
<td>.09</td>
<td>.32</td>
<td>.0</td>
<td>0</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Communication</td>
<td>26</td>
<td>1377</td>
<td>.28</td>
<td>.16</td>
<td>23.49</td>
<td>.24</td>
<td>.33</td>
<td>.35</td>
<td>.28</td>
<td>23.96</td>
<td>-.20</td>
</tr>
<tr>
<td>Performance</td>
<td>21</td>
<td>1221</td>
<td>.25</td>
<td>.25</td>
<td>24.71</td>
<td>.20</td>
<td>.31</td>
<td>.31</td>
<td>.27</td>
<td>25.06</td>
<td>-.21</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>5</td>
<td>156</td>
<td>.52</td>
<td>.25</td>
<td>28.41</td>
<td>.41</td>
<td>.64</td>
<td>.63</td>
<td>.25</td>
<td>30.68</td>
<td>.14</td>
</tr>
<tr>
<td>Viability</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Community</td>
<td>36</td>
<td>1843</td>
<td>.40</td>
<td>.24</td>
<td>24.71</td>
<td>.36</td>
<td>.44</td>
<td>.47</td>
<td>.24</td>
<td>26.16</td>
<td>.00</td>
</tr>
<tr>
<td>Performance</td>
<td>25</td>
<td>1262</td>
<td>.28</td>
<td>.16</td>
<td>66.57</td>
<td>.23</td>
<td>.33</td>
<td>.33</td>
<td>.11</td>
<td>68.27</td>
<td>.12</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>9</td>
<td>535</td>
<td>.66</td>
<td>.16</td>
<td>21.54</td>
<td>.62</td>
<td>.71</td>
<td>.77</td>
<td>.16</td>
<td>25.18</td>
<td>.46</td>
</tr>
<tr>
<td>Viability</td>
<td>2</td>
<td>46</td>
<td>.66</td>
<td>.10</td>
<td>100.00</td>
<td>.50</td>
<td>.83</td>
<td>.81</td>
<td>0</td>
<td>100.00</td>
<td>.81</td>
</tr>
<tr>
<td>Conflict</td>
<td>8</td>
<td>341</td>
<td>-.14</td>
<td>.32</td>
<td>22.69</td>
<td>-.25</td>
<td>-.04</td>
<td>-.17</td>
<td>.34</td>
<td>22.75</td>
<td>-.84</td>
</tr>
<tr>
<td>Performance</td>
<td>5</td>
<td>181</td>
<td>.01</td>
<td>.31</td>
<td>29.31</td>
<td>-.13</td>
<td>.16</td>
<td>.02</td>
<td>.31</td>
<td>29.31</td>
<td>-.59</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>3</td>
<td>160</td>
<td>-.32</td>
<td>.22</td>
<td>32.49</td>
<td>-.46</td>
<td>-.18</td>
<td>-.40</td>
<td>.22</td>
<td>32.82</td>
<td>-.84</td>
</tr>
<tr>
<td>Viability</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Commitment</td>
<td>11</td>
<td>772</td>
<td>.52</td>
<td>.25</td>
<td>28.41</td>
<td>.41</td>
<td>.64</td>
<td>.63</td>
<td>.25</td>
<td>30.68</td>
<td>.14</td>
</tr>
<tr>
<td>Performance</td>
<td>8</td>
<td>564</td>
<td>.27</td>
<td>.21</td>
<td>29.03</td>
<td>.19</td>
<td>.34</td>
<td>.30</td>
<td>.19</td>
<td>29.38</td>
<td>-.08</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>3</td>
<td>208</td>
<td>.50</td>
<td>.02</td>
<td>100.00</td>
<td>.40</td>
<td>.61</td>
<td>.56</td>
<td>0</td>
<td>100.00</td>
<td>.56</td>
</tr>
<tr>
<td>Viability</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Coordination</td>
<td>14</td>
<td>1066</td>
<td>.38</td>
<td>.15</td>
<td>44.93</td>
<td>.33</td>
<td>.43</td>
<td>.44</td>
<td>.12</td>
<td>47.81</td>
<td>.20</td>
</tr>
<tr>
<td>Performance</td>
<td>11</td>
<td>891</td>
<td>.35</td>
<td>.14</td>
<td>48.13</td>
<td>.29</td>
<td>.41</td>
<td>.40</td>
<td>.11</td>
<td>51.09</td>
<td>.18</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>3</td>
<td>175</td>
<td>.53</td>
<td>.05</td>
<td>100.00</td>
<td>.42</td>
<td>.64</td>
<td>.63</td>
<td>0</td>
<td>100.00</td>
<td>.63</td>
</tr>
<tr>
<td>-------------</td>
<td>---</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>--------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>---</td>
<td>--------</td>
<td>-----</td>
</tr>
<tr>
<td>Viability</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Face-to-face Contact</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Performance</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Viability</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Cross-cultural Implications</td>
<td>1</td>
<td>98</td>
<td>.12</td>
<td>0</td>
<td>.</td>
<td>-.08</td>
<td>.32</td>
<td>.15</td>
<td>0</td>
<td>.</td>
<td>.15</td>
</tr>
<tr>
<td>Performance</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>1</td>
<td>98</td>
<td>.12</td>
<td>0</td>
<td>.</td>
<td>-.08</td>
<td>.32</td>
<td>.15</td>
<td>0</td>
<td>.</td>
<td>.15</td>
</tr>
<tr>
<td>Viability</td>
<td>0</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>

$k =$ total number of correlations included in the meta-analysis; $N =$ total number of teams; $SWMr =$ sample size weighted mean observed correlation; $SD_{SWMr} =$ standard deviation of sample size weighted mean observed correlation; $\%$SEV $=$ percentage of the variance due to sampling error; 95% CI $=$ 95% confidence interval around $\rho$; $\rho =$ corrected sample size weighted mean observed correlation; $SD\rho =$ standard deviation of corrected sample size weighted mean observed correlation; $\%$ARTV $=$ percentage of the variance due to all corrected artifacts; 95% CV $=$ 95% credibility interval around $\rho$; $FD_k =$ number of unpublished/unreported studies reporting null findings needed to reduce $\rho$ to .10.
### Table 7

**Summary Table of Hypotheses and Results**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypothesis 1</strong>: There will be a positive relationship between all identified virtual team <em>composition</em> best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each selection best practice will be positively related to important virtual team outcomes.</td>
<td><strong>Supported (small, positive relationship)</strong></td>
</tr>
<tr>
<td>(H1a) identified virtual team KSAOs</td>
<td><strong>Could not be tested</strong></td>
</tr>
<tr>
<td>(H1b) “Boundary spanning,”</td>
<td><strong>Not supported</strong></td>
</tr>
<tr>
<td>(H1c) team diversity on experience and skills</td>
<td><strong>Supported (small, positive relationship)</strong></td>
</tr>
<tr>
<td>(H1d) team member familiarity (with each other)</td>
<td><strong>Supported (small, positive relationship)</strong></td>
</tr>
<tr>
<td><strong>Hypothesis 2</strong>: There will be a positive relationship between all identified virtual team <em>communication</em> best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each communication best practice will be positively related to important virtual team outcomes.</td>
<td><strong>Supported (medium, positive relationship)</strong></td>
</tr>
<tr>
<td>(H2a) multiple communication mediums</td>
<td><strong>Not supported</strong></td>
</tr>
<tr>
<td>(H2b) a communication medium high in media richness</td>
<td><strong>Supported (medium, positive relationship)</strong></td>
</tr>
<tr>
<td>(H2c) communication plan</td>
<td><strong>Could not be tested</strong></td>
</tr>
<tr>
<td>(H2d) frequent communication</td>
<td><strong>Supported (medium, positive relationship)</strong></td>
</tr>
<tr>
<td><strong>Hypothesis 3</strong>: There will be a positive relationship between all identified virtual team <em>community</em> best practices and important virtual team outcomes (performance, satisfaction, and viability). Specifically, each community best practice will be positively related to important virtual team outcomes.</td>
<td><strong>Supported (medium, positive relationship)</strong></td>
</tr>
<tr>
<td>(H3a) interpersonal relationship development strategies (e.g., humanizing interactions, informal communication time, networking)</td>
<td><strong>Supported (medium, positive relationship)</strong></td>
</tr>
</tbody>
</table>
(H3b) prioritization of relationship building will be positively related to virtual team outcomes

(H3c) the presence of trust

**Could not be tested**

**H4a**: *Task conflict* will be positively related to virtual team outcomes; whereas

**H4b**: *Process conflict* will be negatively related to virtual team outcomes.

**H4c**: *Interpersonal conflict* will be negatively related to virtual team outcomes.

**Hypothesis 5**: There will be a positive relationship between all identified virtual team *commitment* best practices and important virtual team outcomes (performance, satisfaction, and viability).

Specifically, each leadership best practice will be positively related to important virtual team outcomes.

(H5a) engagement

(H5b) empowerment

(H5c) LMX

**Supported (medium, positive relationship)**

**Hypothesis 6**: *Structured work* (e.g., clear expectations, goals, meeting schedules, processes, and work flow) will be positively related to important virtual team outcome (performance, satisfaction, and viability).

**Supported (medium, positive relationship)**

**Research Question 1**: Is the order of face-to-face and technologically mediated communication important (e.g., face-to-face first, then technologically mediated communication or technologically mediated communication first, then face-to-face)?

**Could not be tested**

**Hypothesis 7**: *Cultural sensitivity* will be positively related to important virtual team outcomes (performance, satisfaction, viability).

**Not supported (one study)**

**Hypothesis 8**: Team size will moderate the best practice-team outcome relationships, such that small teams will enhance the best-practice-team outcome relationship, and medium or large teams will weaken the best practice-team outcome relationship.

**Partially supported**
**Hypothesis 9:** The best practice-outcome relationships will be moderated by the measure of performance (performance, satisfaction, viability).

*Partially supported*
CHAPTER 6: Discussion

6.1 General Discussion

Organizations’ use of virtual teams is pervasive and expected to increase. As a result of the prevalent use of virtual teams by organizations, the popular business press has proposed best practices for increasing the effectiveness of these virtual teams. However, it is not clear whether these popular business press best practices are supported by empirical research. Thus, the purpose of the current study was to meta-analytically test the best practices found in the popular business literature to determine whether they are supported by empirical evidence as well as review theoretical qualitative evidence that supports or refutes the best practices when direct empirical tests of the best practices are absent. The results of this study can serve as guide to practitioners of strategies to utilize that can increase the effectiveness and efficiencies of virtual teams within their organizations. In the academic realm, it also can serve as a catalyst for future research to investigate the virtual team best practices that were identified in the popular business press but have yet to be examined in the empirical literature.

Overall, many of the main categories of virtual team best practices promulgated by the popular business press were supported by empirical research (i.e., communication, community, leadership, and structured work). Other best practices received less support (i.e., selection), had mixed support (i.e., conflict), or were not able to be tested (i.e., cultural sensitivity and order of face-to-face communication). The more specific best practices suggested by the popular business press did not receive equal attention in the empirical literature. With the exception of trust, many of the more specific aspects of the overall best practices categories were supported by few studies or were not able to be
tested. Finally, it appears that the relationships between virtual team best practices and important virtual team outcomes might be more nuanced than they appear in the popular business press literature. The moderator analysis suggested that team size and type of performance outcome influence the virtual team best practice-outcome relationship, such that small and large teams generally benefit more from virtual team best practices than medium teams, and best practices generally impact satisfaction outcomes to a greater extent than performance outcomes.

6.2 Level 1 and Level 2 Best Practices

There were four Level 1 best practices that demonstrated positive, medium effects with important virtual team outcomes: communication, community, commitment, and coordination. The implications of these findings will be discussed below, followed by a discussion of the remaining popular business press best practices.

The strongest relationship between a virtual team Level 1 best practice and virtual team outcomes was community (e.g., building relationships and trust). This finding is consistent with previous research that cited the importance of social aspects in achieving virtual team effectiveness (Purnvanova, 2014). The community best practice-virtual team outcome relationship was primarily driven by the Level 2 best practice of trust. However, the popular business press Level 2 best practices are not consistent with the community constructs investigated in the empirical literature. For example, trust consisted 15% of the popular business press literature Level 2 (specific) best practices; whereas, it accounted for 85% in the empirical literature included in the meta-analysis.

The two community Level 2 best practices with empirical support, trust and interpersonal relationship development, both demonstrated similar relationships with
virtual team outcomes ($\rho = .39$ and $\rho = .40$), respectively. Although trust had more studies contributing to the overall effect, it appears that both are effective community building strategies to achieve effective virtual team outcomes.

Team sub-groups are one potential aspect of teams that could impact the development of trust and relationship building but was not specifically tested in this meta-analysis. Sub-groups within teams have received a fair amount of attention in the broader team literature, and theoretical work has discussed the potential impacts in the context of virtual teams (e.g., Carton & Cummings, 2012). However, empirical studies examining the potential influence of sub-groups on virtual teams are lacking, and the few studies that have investigated this area have found that sub-groups tend to have a negative impact on virtual teams (Polzer, Crisp, Jarvenpaa, & Kim, 2006; O’Leary & Mortensen, 2010). Thus, further research is needed to understand the impact of sub-groups on the community best practices.

Coordination (structuring work) and important virtual team outcomes was the second strongest relationship, highlighting the need to focus on the task, in addition to relationships. Virtual teams can be more ambiguous interpersonally and are found to be more beneficial for routine tasks or monitoring progress (Powell et al., 2006); consequently, the need to clearly structure work through setting goals, clarifying processes, and establishing norms is important for virtual teams. Furthermore, structuring work through the development of norms can reduce the team startup time and eliminate the need to reinvent operating practices (Duarte & Snyder, 2001). Thus, the importance of coordination that is discussed in the popular business press literature is reinforced by the current study’s results.
There were a large number of popular business press best practices that focused on structuring work, particularly around expectations, goals, meeting organization, establishing processes, and work flow. The number of coordination best practices in the popular business press, however, did not mirror the aspects of structuring work that were empirically tested within a virtual team context in the empirical literature. Duarte and Synder (2001) identified five common processes for structuring work: clear rules and expectations for specific technology use; effective performance clearly defined; creation of a team charter which outlines team norms and expectations; development of a project plan with important dates and specific outcomes for each team member; and agreement on documentation and reporting (including archiving electronic communication and information). Although these processes are likely shared with face-to-face teams; the importance of clarifying these processes for virtual teams is heightened. In face-to-face teams expectations that are vague or unclear are often clarified through informal hallway conversations; however, virtual teams do not have the opportunity for the same informal conversations, so structure becomes more important. The current research on virtual teams does not compare these different methods of structuring work. Further research is needed to better understand the specific aspects of structuring work that are contributing to virtual team effectiveness and whether certain strategies for structuring work are more beneficial than others. In addition, many virtual team studies might have structured work in the early phase of their lifecycle; however, it is possible that when some field empirical investigations test aspects of virtual teams, they are not involved in the beginning stages of the formation of the virtual team. Thus, the studies in which structuring work is not
reported does not necessarily indicate that the virtual team did not employ some of these strategies.

Leadership (commitment) demonstrated the next largest relationship with important virtual team outcomes. The current study’s results reinforce the empirical literature’s importance placed on leadership within virtual teams. The specific aspects of leadership (empowerment, engagement, LMX) all contributed similarly to the overall leadership (commitment) best practice relationship with performance; thus, each of these components could be employed as strategies to increase the effectiveness of virtual teams.

Leaders play an integral role in the success of virtual teams, particularly in their influence on virtual teams’ response to challenges and adaption when presented with unforeseen events (Gilson et al., 2015). The current study confirms that the various aspects of leadership are contributing similarly to effective virtual team outcomes, but the popular business press best practices do not focus on the specific traits or identification of a virtual team leader.

Mukherjee and colleagues (2012) argue that specific cognitive, social, and behavioral capabilities of a virtual team leader will be important throughout the lifecycle of a team. An example of a cognitive capability is recognizing unique development needs of team members, social capability is being considerate to various group member needs, and behavioral is encouraging learning and creativity. Although these characteristics are not unique to virtual teams, virtual team leaders have the added challenge of potentially never (or rarely) meeting other team members face-to-face or leading a team that consists of members from various cultures. By extension, virtual
teams will necessitate a different skill set from leaders to ensure effectiveness (Cascio & Shurygailo, 2003). The academic and popular business press literature would benefit from understanding how to identify and prepare leaders to be successful when faced with the unique challenges of leading a virtual team.

Communication is the fourth and final Level 1 best practice that demonstrated a medium relationship with important virtual team outcomes, a finding that is consistent with the empirical literature. However, there was variability amongst the effect sizes, suggesting that moderators are likely operating. Media richness and communication frequency are the two specific (Level 2) best practices that appear to be contributing to the overall communication effective size, as communication mediums did not display a relationship with important virtual team best practices. One potential explanation for the lack of findings related to communication mediums is that the academic research might not be keeping up with practice in terms of investigating specific tools that team members use to communicate with one another. For example, many new technology tools exist that allow team members to collaborate (e.g., Blackboard), share documents (SharePoint, Dropbox), co-create documents (Google Docs), meeting tools (GoToMeeting, Lync, Google Hangouts), social networking tools designed for the workplace (e.g., Yammer), and project management (e.g., Basecamp). The literature still remains heavily focused on traditional technology tools such as email, instant messaging, and audio or video-conference (to a lesser extent). Thus, further research is needed to better understand how the new technology tools are being leveraged and contributing to the success of virtual teams.
Although there was a moderate positive effective between communication frequency and virtual team outcomes, the popular business press should not oversimplify this relationship and recommend that communicating at a high frequency will lead to more effective virtual team outcomes. There is an important distinction that needs to be made between communication quality and communication frequency. When the nature of communication revolves around team member roles and responsibilities through the communication of central, useful information, shared mental models (knowledge organization of a performance domain) will develop, which will ultimately lead to more effective performance (Cannon-Bowers, Salas, & Converse, 1993; Espevik, Johnsen, & Eid., 2011). The shared mental model fosters better coordination among team members (Espevik et al., 2011). Future research should focus on communication quality and understanding how shared mental models develop in virtual teams. Virtual teams pose unique challenges for ensuring quality communication (Hertel et al., 2005) due to the absence of nonverbal cues, time delay, and interpretation of written text (Cohen & Gibson, 2003; Cramton, 2001). Practitioners would benefit from focusing on the frequency of communication in the context of quality community as communication quality is positively related to performance (Urban, Bowers, Monday, & Morgan, 1995).

There was one communication Level 2 best practices that was not able to be tested meta-analytically: the presence of a communication plan. Interestingly, there were four best practices citing the need for a communication plan; however, no empirical studies explicitly measured this relationship. It is possible, however, that the communication plan is inherent in other constructs that measure goals and clarifying processes.
Composition best practices demonstrated the smallest, positive effect for the relationships that were able to be tested meta-analytically. Although selection is widely studied and an important factor in team effectiveness, a number of causes could have contributed to the small effect. One potential explanation is that selection is a distal variable and the other variables are proximal to the outcome variables. Given that selection variables are likely influencing more proximal constructs (e.g., communication, community), which then impact virtual team outcomes, the selection-virtual team outcome relationship might be weakened, compared to the proximal variables. Another potential explanation is the way in which the variables are measured. Selection variables assessed in this study are demographic and more objective in nature; whereas, other best practices (e.g., trust) are subjective and measured via self-report. Given that outcome measures, particularly satisfaction, are also measured through self-report, there is the potential to underestimate the selection-outcome relationship and overestimate other relationships in which both constructs are measured via self-report. Finally, it is also possible that range restriction is impacting the relationship between selection best practices and virtual team outcomes, particularly for team diversity on experience and skills. There is potentially a restricted range of scores, reducing the correlations, given that all members participating in the team where either already selected on a specific set of criteria to either be accepted to a university (experimental study) or offered a position at a company (applied study).

The KSAOs that are articulated in the popular business press literature are not consistent with those studied in the empirical literature; thus, KSAOs were not tested in the current meta-analysis. For example, some of the KSAOs in the popular business
press (e.g., love working from home, self-directed, embody brand representation, technology savvy) are not necessarily common psychological constructs investigated in empirical literature. One of the KSAOs in the popular business press, having good communication skills, is typically not tested as a team input, but is tested during the process stage of a team’s tenure (e.g., nature of the communication between team members). Although there is not an overabundance of articles investigating virtual team KSAOs, the empirical literature tends to focus on personality variables (e.g., extraversion, openness to experience). Finally, the configuration of KSAOs is likely more important than team members possessing the KSAOs themselves. Configuration best practices that are recommended in the popular business press were investigated more frequently in the empirical literature compared to the selection best practices. For example, diversity of experience and familiarity with each other have been receiving increasing attention in the empirical literature. The results that team familiarity demonstrated a medium, positive relationship with virtual team outcomes is consistent with the empirical literature. Unlike the empirical literature, the popular business press does not suggest best practices concerning the composition of teams concerning deep- (e.g., personality) or surface-level (e.g., sex) characteristics.

Conflict was the final Level 1 Best Practice that was tested meta-analytically, and the results suggested mixed support for the conflict hypotheses. The negative relationship between task conflict and virtual team outcomes was unexpected, based on the popular business press best practice but not unexpected based on the empirical literature. The relationships between the other two types of conflict, process and interpersonal, echoed findings in the empirical literature. Many studies conducted within teams found that task
conflict demonstrates a positive relationship with performance outcomes (e.g., Eisenhardt, Kahwajy, & Bourgeois, 1997; Jehn, 1995) through encouraging team members to evaluate alternative solutions and avoid “groupthink” (Janis, 1982). In contrast with traditional face-to-face teams, the empirical literature suggests that task conflict (along with the other types of conflict) will not benefit virtual team performance outcomes. Conflict only benefits teams when it is resolved through a process of shared understanding, and sharing complex information and arriving at a shared understanding within virtual teams can be challenging (Kraut et al., 2002).

Thus, the results of the current study, although interpreted with caution due to a limited number of studies contributed to the effects, suggests that virtual teams do not benefit from conflict, regardless of the type of conflict present. Practitioners would benefit from the work that has been conducted in the academic realm, and the popular business press should heed caution when recommending task conflict as a best practice based on the current study’s results and the psychology underpinnings of how conflict benefits performance outcomes in teams. Practitioners and the popular business press should rather focus on conflict management strategies, given that conflict is more likely to occur in virtual teams (Furumo, 2009) and could have more detrimental effects on performance outcomes, compared to traditional face-to-face teams.

There is increasing attention on culture sensitivity within the empirical literature; however, only one study tested this relationship in virtual teams. The attention within the culture realm in the context of virtual teams has shifted to the importance of culture sensitivity training (Purvanova, 2014). The virtual team literature and subsequent popular business press best practices would benefit from a stronger understanding of how to
increase culture sensitivity of team members and its relationship with important virtual team outcomes.

6.3 Moderators

6.3.1 Team Size. Overall, medium teams had the smallest effect size, compared to small and large teams and this trend held across all best practices. Thus, it appears that small and large teams benefit the most from communication best practices (using a rich communication medium, frequency of communication, multiple communication mediums). Large teams benefit the most from structured work; however, this is interpreted with caution due to a small number of studies contributing to the effect. Large teams also benefit more from socialization and leadership best practices, compared to small and medium teams. Although the pattern for small and large teams to demonstrate stronger relationships between virtual team best practices and virtual team outcomes held for communication, the effect was smaller for large teams, compared to other best practices. Previous studies have found that the flow of communication can be more confusing in larger teams, so they often rely on less sophisticated technology to communicate (e.g., e-mail and instant messaging). Thus, the large teams might not be benefiting from the advantages of richer media.

6.3.2 Performance Type. One benefit of virtual team research is virtual team performance is often easier to document, compared to face-to-face teams, because most interactions, goals, and outcomes are archived electronically (Cohen & Gibson, 2003). Thus, the majority of virtual team empirical studies measured performance outcomes. Four studies did not report performance outcomes and only reported satisfaction. Given the advantage that virtual teams provided in documenting performance, empirical
research should leverage this advantage and measure performance outcomes when studying virtual teams. There were few studies that tested the relationship between virtual team best practices and viability. Virtual teams are often composed to work on a specific project for a defined period, which could explain the lack of focus on virtual team viability.

Not surprisingly, the interpersonal oriented best practices demonstrated a stronger relationship with satisfaction. Interestingly, the task-oriented best practice also demonstrated this relationship. The best practices and satisfaction outcomes are often both measured via self-report, which could be contributing to the stronger relationship between the best practice and satisfaction, compared to performance. The type of performance outcome seems to have the most impact on the conflict best practice: there is no relationship between conflict and performance outcomes, but there is a medium negative relationship between conflict and satisfaction outcomes.

For the other best practices, with the exception of composition, the best practice-performance outcome remains a medium effect (consistent with the overall effect) but the best practice-satisfaction outcome is a large effect. Given that virtual teams can be challenging for team members due to issues related to “out of sight, out of mind” and difficulties in fostering relationships with team members, the results of the meta-analysis are encouraging in that best practices can help virtual team members’ enjoyment of working in a virtual team environment.

6.4 Virtual Team Literature.

Both the virtual team empirical literature and popular business press acknowledge the increasing prevalence and reliance on virtual teams in the workplace. However, as
discussed, there appears to be a mismatch between the specific constructs being investigated in the empirical literature and those that are being recommended by the popular business press. Given this discrepancy elevates many research opportunities within virtual teams. The following are examples of important research questions for each Level 1 best practice that could be tested to reconcile the popular business press best practices and the empirical literature:

1. Composition: What KSAOs of virtual teams contribute to virtual team success?
2. Communication: What is the relationship between the utilization of more recent available technologies and virtual team outcomes?
3. Community: Are there other strategies for building relationships in addition to trust? What is the most effective way to build trust within a virtual team?
4. Conflict: Are there any scenarios for virtual teams in which task conflict leads to positive performance outcomes?
5. Commitment: What is the best approach for identifying and preparing leaders to be successful in a virtual team environment?
6. Coordination: Are certain strategies for structuring work more beneficial than others for virtual teams?
7. Contact: Does the timing of a face-to-face meeting matter for teams operating primarily in a virtual environment?
8. Cultural Sensitivity: Is training effective in increasing cultural sensitivity and is cultural sensitivity related to positive virtual team outcomes?

6.5 Practical Implications
The results have implications for practitioners in organizations that are using virtual teams. One heartening finding is that it is possible to have successful virtual teams, particularly when utilizing best practices. In the beginning phases of a virtual team, practitioners would benefit from dedicating time on providing structure for the team, through the creation of norms and goal setting. Shifting the focus from individual characteristics when selecting virtual teams to how to increase the effectiveness of virtual team processes, both task and interpersonal processes, could lead to more effective virtual team outcomes. For task related processes, utilizing communication best practices of using richer media and communicating frequently will lead to enhanced virtual team outcomes. Using multiple communication mediums did not prove to lead to better virtual team outcomes. It is possible that the added complexity of learning and using multiple technology platforms can hinder a team’s success. Furthermore, practitioners must take the time to focus on developing the interpersonal relationships amongst the team members. Building trust is one specific strategy to strengthen the relationships amongst team members, which leads to more effective performance. Finally, leadership of a virtual team is important to a virtual team success, and practitioners should ensure that their virtual team leaders understand how to empower, engage, and build relationships with the team members, recognizing that leading a virtual team is different than leading a traditional team.

The moderator analysis suggests that practitioners should be cognizant of the potential impact of team size. Small and large teams tend to benefit more from virtual team best practices. Thus, if practitioners have flexibility in team size when selection virtual teams or changing the size once a virtual team is operating (e.g., combining two
medium teams into one large team) could lead to more positive virtual team outcomes when leveraging virtual team best practices. Finally, practitioners must also recognize that these best practices have more of an impact on enhancing a team’s satisfaction, than performance.

6.6 Limitations

One limitation of the current study was the limited number of studies that were contributing to testing some of the Level 2 best practices. Although this is a limitation for the current study, it should serve as a call for future studies in these areas. Each of the Level 2 best practices are being recommended by the popular business press literature; however, many do not have empirical work to support the best practices. There is a vast opportunity in the virtual team literature to begin to empirically test some of these hypotheses.

A second limitation pertains to the interconnectedness of the virtual team best practice relationships. Some of these relationships are complex, as it seems that multiple moderators are operating on these relationships simultaneously. There is still a substantial amount of variance that remains unaccounted for after correcting for statistical artifacts. It is possible that additional moderators are still operating, and it would be beneficial to increase the number of studies that tested the relationships so that a larger $k$ would be present when testing for moderators. For the majority of the studies these best practices were not the variable of interest (with the exception of trust) and are correlational in nature. Thus, future research should manipulate variables and isolating best practices to better understand the incremental value that a best practice has on virtual team outcomes.
Finally, a third limitation is the treatment of virtuality in the current study. The term “virtuality” is a more recent method of characterizing virtual teams. Previous literature typically dichotomized virtual teams and face-to-face teams, which failed to account for the different dimensions or characteristics that can differentiate virtual teams (e.g., technology utilized by the team and the extent to which it simulates a face-to-face interaction). Kirkman and Mathieu (2005) advanced the theoretical understanding of virtual teams by delineating a multi-dimensional framework of “team virtuality” that can serve as a model for future research efforts on virtual teams. The authors’ typology slightly contrasts Bell and Kozlowski’s (2002) earlier virtuality framework, whose dimensions included temporal distribution, boundary spanning, lifecycle, and member roles, in that it suggests removing geographical dispersion as requirement for a team to be designated as virtual.

Although numerous dimensions of virtuality have been put forth, the two most consistent dimensions that are used are geographic location and technology use (e.g., Cohen & Gibson, 2003). Geographic location (or dispersion) has typically been captured by either a single item, which asks team members to report how many times they met face-to-face (e.g., Kirkman et al., 2004), or as an aggregate of various aspects of geographic dispersion, such as number of miles between members (Hoch & Kozlowski, 2012). Technology use is commonly operationalized by having team members report the percentage of their time that they use commuter-mediated communication tools to work with their other team members (e.g., Rapp, Ahearn, Mathieu, & Rapp, 2010). The computer-mediated communication tools are then characterized by media richness to calculate virtuality (Ganesh & Gupta, 2010). Empirical work needs to catch up to the
theoretical work that has been conducted in this area. In a recent review of virtual team literature from the last decade, Gilson and colleagues (2015) found that although increasing, less than one third of the empirical articles on virtual teams assessed virtuality. In addition, there is still a lack of consensus regarding whether virtuality should be considered an input (e.g., Kock & Lynn, 2012) or a moderator (e.g., Andressen et al., 2012). Thus, the field would benefit from a common measurement of virutality, which would enable comparisons across studies and a virtuality moderator analysis in a meta-analytic investigation.

6.7 Conclusions

In summary, the way in which we work is evolving, and virtual teams are becoming more common in the workplace. Despite the increase in virtual teams, it is evident that the virtual team literature is still developing. The purpose of the current study was to evaluate whether the best practices promulgated by the popular business press literature received any empirical support. It appears that virtual team popular business press best practices are not consistency researched in the literature (e.g., trust and communication are more common than others). Although the overall categories of best practices were generally supported by the literature, when these relationships are tested further by the specific best practices, it is clear that certain best practices are driving these relationships. In general, across all best practices, small and large teams benefit the most from the use of virtual team best practices and these best practices are typically impacting team satisfaction more than team performance. Researchers can improve the landscape of virtual team literature and continue to investigate virtual team
best practices. Finally, practitioners should employ these virtual team best practices to leverage the benefits of virtual teams.
References


*Organizational Dynamics, 30*, 356–367.


http://www.corpedgroup.com/resources/pm6BestPracticesMVT.asp


## Appendix A: Best Practices

### Popular Business Press Best Practices for Composition: Selection and Configuration

<table>
<thead>
<tr>
<th>Level 1 Dimension</th>
<th>Level 2 Dimension</th>
<th>Specific Best Practice</th>
<th>Title</th>
<th>Source</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Configuration</strong></td>
<td>Diversity</td>
<td>Stack the deck.</td>
<td>How to Build a Great Virtual team</td>
<td><em>Inc.</em></td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>Network</td>
<td>Choose a few team members who already know each other.</td>
<td>Building an All-Star Virtual Team</td>
<td><em>Entrepreneur</em></td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td>Number of members</td>
<td>Small is Beautiful</td>
<td>Managing Virtual Teams: Ten Tips</td>
<td><em>Forbes</em></td>
<td>2013</td>
</tr>
<tr>
<td><strong>Selection</strong></td>
<td>Experience</td>
<td>When building a virtual team, solicit volunteers as much as possible.</td>
<td>How to Build a Great Virtual team</td>
<td><em>Inc.</em></td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Go for experienced hires.</td>
<td>How to Build a Great Virtual team</td>
<td><em>Inc.</em></td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Find people who have successfully worked from home in the past.</td>
<td>Building an All-Star Virtual Team</td>
<td><em>Entrepreneur</em></td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td>Interview</td>
<td>Look for shared understanding when recruiting</td>
<td>3 tips for managing a virtual team</td>
<td><em>Inc.</em></td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>KSAOs</td>
<td>Find people who really, really love working from home</td>
<td>No office, no problem: 5 strategies for managing an all-virtual team</td>
<td><em>Fast Company</em></td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Virtualize existing team members who require little management.</td>
<td>Building an All-Star Virtual Team</td>
<td><em>Entrepreneur</em></td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Define the ideal employee</td>
<td>Building an All-Star Virtual Team</td>
<td><em>Entrepreneur</em></td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communications skills—writing clearly, reading carefully—are essential</td>
<td>To Make Virtual Teams Succeed, Pick the Right Players</td>
<td><em>Harvard Business Review</em></td>
<td>2013</td>
</tr>
<tr>
<td>Level 1 Dimension</td>
<td>Level 2 Dimension</td>
<td>Specific Best Practice</td>
<td>Title</td>
<td>Source</td>
<td>Year</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>-------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When selecting team members, it is useful to conduct at least one interview using the technology the team member will be expected to use on a day-to-day basis. Of course, affinity with communications technology should not be the main deciding factor.</td>
<td>Ten Tips for Managing Virtual Teams</td>
<td>The Economist</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Figure out how the new employee will represent the brand.</td>
<td>5 Tips for Virtual Collaboration</td>
<td>Forbes</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Start building the dream team!</td>
<td>Managing Virtual Teams: Ten Tips</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td>Location</td>
<td></td>
<td>Allow for possible compromises</td>
<td>Working Together…When Apart</td>
<td>Wall Street Journal</td>
<td>2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hire in hubs.</td>
<td>To Make Virtual Teams Succeed, Pick the Right Players</td>
<td>Harvard Business Review</td>
<td>2013</td>
</tr>
<tr>
<td>Network</td>
<td></td>
<td>Identify &quot;boundary spanners&quot; and ensure that they make up at least 15% of the team.</td>
<td>Virtual Teams Can Outperform Traditional Teams</td>
<td>Harvard Business Review</td>
<td>2012</td>
</tr>
<tr>
<td>Level 1 Dimension</td>
<td>Level 2 Dimension</td>
<td>Specific Best Practice</td>
<td>Title</td>
<td>Source</td>
<td>Year</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>-------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>Communication Medium</td>
<td>Media Richness</td>
<td>Use the most interactive medium feasible.</td>
<td>How to Get Remote Teams to Work Together</td>
<td>Inc.</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select Appropriate Technologies for Team Interactions</td>
<td>Why Purely Virtual Teams Don't Work</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leverage the best communication technologies</td>
<td>Three tips for making virtual teams work</td>
<td>Harvard Business Review</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You don't need pricey tools to communicate.</td>
<td>How to Build a Great Virtual team</td>
<td>Inc.</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>What is the best technology solution for my team?</td>
<td>Top 6 Best Practices for Managing Virtual Teams</td>
<td>Corporate Education Group</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>Multiple Mediums</td>
<td>Use Technology Aggressively</td>
<td>How to Build a Great Virtual team</td>
<td>Inc.</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mix communication mediums</td>
<td>How to Get Remote Teams to Work Together</td>
<td>Inc.</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use different types of media.</td>
<td>3 tips for managing a virtual team</td>
<td>Inc.</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>Other Tool Characteristics</td>
<td>Make effective use of online project management tools like Redmine and Basecamp.</td>
<td>Ten Tips for Managing Virtual Teams</td>
<td>The Economist</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Communications tools need to be carefully selected, taking into account cultural and gender preferences</td>
<td>5 Tips for Virtual Collaboration</td>
<td>Forbes</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>There is plenty of scope for misunderstanding in virtual</td>
<td>The Four Keys To Success With Virtual Teams</td>
<td>Forbes</td>
<td>2010</td>
</tr>
<tr>
<td>Level 1 Dimension</td>
<td>Level 2 Dimension</td>
<td>Specific Best Practice</td>
<td>Title</td>
<td>Source</td>
<td>Year</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>-------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>environments, so never make assumptions. Hyper-communication is essential—check and double-check.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>talk often</td>
<td>Virtual Teams Can Outperform Traditional Teams</td>
<td>Harvard Business Review</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Encourage frequent communication. But don't try to force social gatherings.</td>
<td>Three tips for making virtual teams work</td>
<td>Harvard Business Review</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>You must communicate differently.</td>
<td>No office, no problem: 5 strategies for managing an all–virtual team</td>
<td>Fast Company</td>
<td>2014</td>
</tr>
<tr>
<td>Plan</td>
<td></td>
<td>Build a culture of effective electronic communication</td>
<td>Five Things Every Virtual Manager Should Do</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Develop and Use a Communications Management Plan and Team Operating Agreements</td>
<td>Working Together…When Apart</td>
<td>Wall Street Journal</td>
<td>2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commit to a communication charter</td>
<td>No office, no problem: 5 strategies for managing an all–virtual team</td>
<td>Fast Company</td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Managers need to set clear rules for communication, for example by setting an e-mail response time of 24 hours. Compliance with the rules needs to be constantly monitored.</td>
<td>Managing Virtual Teams: Ten Tips</td>
<td>Forbes</td>
<td>2013</td>
</tr>
</tbody>
</table>
### Popular Business Press Best Practices for Building Interpersonal Relationships

<table>
<thead>
<tr>
<th>Level 1 Dimension</th>
<th>Level 2 Dimension</th>
<th>Specific Best Practice</th>
<th>Title</th>
<th>Source</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socialization</td>
<td>Build Trust</td>
<td>Encourage informal conversations</td>
<td>Building Virtual Teams: Strategies For High Performance</td>
<td>Forbes</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Build virtual trust</td>
<td>Ten Tips for Managing Virtual Teams</td>
<td>The Economist</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Humanize Interactions</td>
<td>Create a Virtual Personality and Presence</td>
<td>Building an All-Star Virtual Team</td>
<td>Entrepreneur</td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Humanize the communications.</td>
<td>Working Together…When Apart</td>
<td>Wall Street Journal</td>
<td>2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Be creative with team bonding</td>
<td>The Four Keys To Success With Virtual Teams</td>
<td>Forbes</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>Informal Interaction</td>
<td>Be a Great Host/Hostess</td>
<td>Five Things Every Virtual Manager Should Do</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Figure out the type of team needed</td>
<td>Making Virtual Teams Work: Ten Basic Principles</td>
<td>Harvard Business Review</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Create an online site where a team can collaborate, exchange ideas and inspire one another</td>
<td>How to Get Remote Teams to Work Together</td>
<td>Inc.</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Schedule informal time.</td>
<td>Ten Tips for Managing Virtual Teams</td>
<td>The Economist</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Create a “virtual water cooler”</td>
<td>Working Together…When Apart</td>
<td>Wall Street Journal</td>
<td>2007</td>
</tr>
<tr>
<td></td>
<td>Networking</td>
<td>Take advantage of being in the same place.</td>
<td>Top 6 Best Practices for Managing Virtual Teams</td>
<td>Corporate Education Group</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rotate</td>
<td>Managing Virtual Teams: Ten Tips</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td>Level 1 Dimension</td>
<td>Level 2 Dimension</td>
<td>Specific Best Practice</td>
<td>Title</td>
<td>Source</td>
<td>Year</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>-------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Build bonds differently</td>
<td>Building Virtual Teams: Strategies For High Performance</td>
<td><em>Forbes</em></td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Invest in an online resource where members can learn quickly about one another.</td>
<td>5 Tips for Virtual Collaboration</td>
<td><em>Forbes</em></td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td>Prioritize</td>
<td>Invest in socializing pre-existing teams</td>
<td>Five Things Every Virtual Manager Should Do</td>
<td><em>Forbes</em></td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>Relationships</td>
<td>Be &quot;at-Hand&quot;</td>
<td>Building Virtual Teams: Strategies For High Performance</td>
<td><em>Forbes</em></td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rapport is critical. Time is also important, in that I mean it takes time to build rapport and an understanding between people.</td>
<td>Managing Virtual Teams: Ten Tips</td>
<td><em>Forbes</em></td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ease off on results</td>
<td>Managing Virtual Teams: Ten Tips</td>
<td><em>Forbes</em></td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Build relationships</td>
<td>5 Tips for Virtual Collaboration</td>
<td><em>Forbes</em></td>
<td>2012</td>
</tr>
</tbody>
</table>
### Popular Business Press Best Practices for Conflict

<table>
<thead>
<tr>
<th>Level 1 Dimension</th>
<th>Level 2 Dimension</th>
<th>Specific Best Practice</th>
<th>Title</th>
<th>Source</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 Dimension</td>
<td>Level 2 Dimension</td>
<td>Specific Best Practice</td>
<td>Title</td>
<td>Source</td>
<td>Year</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>-------------------------</td>
<td>-------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measure on Results</td>
<td>Making Virtual Teams Work: Ten Basic Principles</td>
<td>Harvard Business Review</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>Empowerment</td>
<td>Assign only tasks that are challenging and interesting.</td>
<td>Why Purely Virtual Teams Don't Work</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ensure the task is meaningful to the team and the company.</td>
<td>Top 6 Best Practices for Managing Virtual Teams</td>
<td>Corporate Education Group</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Foster shared leadership</td>
<td>Working Together…When Apart</td>
<td>Wall Street Journal</td>
<td>2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Don’t forget the 1:1</td>
<td>Working Together…When Apart</td>
<td>Wall Street Journal</td>
<td>2007</td>
</tr>
<tr>
<td>Other</td>
<td>Strike a balance</td>
<td></td>
<td>Managing Virtual Teams: Ten Tips</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td>Level 1 Dimension</td>
<td>Level 2 Dimension</td>
<td>Specific Best Practice</td>
<td>Title</td>
<td>Source</td>
<td>Year</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>-------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td>Structure Work</td>
<td>Expectations</td>
<td>Co-create team rules and norms</td>
<td>Five Things Every Virtual Manager Should Do</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Setting expectations and communicating along the way are critical.</td>
<td>Ten Tips for Managing Virtual Teams</td>
<td>The Economist</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clarify and track commitments.</td>
<td>Building Virtual Teams: Strategies For High Performance</td>
<td>Forbes</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manage expectations</td>
<td>Why Purely Virtual Teams Don't Work</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Blend task clarity with work autonomy.</td>
<td>Why Purely Virtual Teams Don't Work</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When you put a group of new team members together, one of the things that you need to do is to provide clarity. You need to provide clarity in terms of what they will be doing as a team, and you need to make sure that they know they can rely on each other.</td>
<td>Building an All-Star Virtual Team</td>
<td>Entrepreneur</td>
<td>2019</td>
</tr>
<tr>
<td>Goals</td>
<td></td>
<td>Joint and common understanding of targets, procedures and the fun involved in achieving the set goals</td>
<td>Making Virtual Teams Work: Ten Basic Principles</td>
<td>Harvard Business Review</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set clear, measurable and achievable goals and carefully monitor progress towards the goals until completion.</td>
<td>Top 6 Best Practices for Managing Virtual Teams</td>
<td>Corporate Education Group</td>
<td>2013</td>
</tr>
<tr>
<td>Level 1 Dimension</td>
<td>Level 2 Dimension</td>
<td>Specific Best Practice</td>
<td>Title</td>
<td>Source</td>
<td>Year</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>-------</td>
<td>--------</td>
<td>------</td>
</tr>
<tr>
<td><strong>Meeting</strong></td>
<td></td>
<td>Create goals for the virtual team.</td>
<td>Top 6 Best Practices for Managing Virtual Teams</td>
<td>Corporate Education Group</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>One weekly meeting can still be extremely helpful.</td>
<td>Virtual Teams Can Outperform Traditional Teams</td>
<td><em>Harvard Business Review</em></td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Organize regular meetings with both individuals and the whole team</td>
<td>Working Together...When Apart</td>
<td><em>Wall Street Journal</em></td>
<td>2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Regularly get together as a whole team</td>
<td>The Four Keys To Success With Virtual Teams</td>
<td><em>Forbes</em></td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gather smaller groups even more regularly.</td>
<td>Managing a Virtual Team</td>
<td><em>Harvard Business Review</em></td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Build a team with rhythm</td>
<td>No office, no problem: 5 strategies for managing an all-virtual team</td>
<td><em>Fast Company</em></td>
<td>2014</td>
</tr>
<tr>
<td><strong>Processes</strong></td>
<td></td>
<td>Clarify tasks and processes, not just goals and roles</td>
<td>Ten Tips for Managing Virtual Teams</td>
<td><em>The Economist</em></td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Slow Down to Speed Up</td>
<td>Managing a Virtual Team</td>
<td><em>Harvard Business Review</em></td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beef up team processes</td>
<td>3 tips for managing a virtual team</td>
<td><em>Inc.</em></td>
<td>2013</td>
</tr>
<tr>
<td><strong>Work Flow</strong></td>
<td></td>
<td>Break the team's work up into modules so that progress in one location is not overly dependent on progress in another.</td>
<td>Ten Tips for Managing Virtual Teams</td>
<td><em>The Economist</em></td>
<td>2009</td>
</tr>
</tbody>
</table>
## Popular Business Press Best Practices for Use and Timing of Face-to-face Meetings

<table>
<thead>
<tr>
<th>Level 1 Dimension</th>
<th>Level 2 Dimension</th>
<th>Specific Best Practice</th>
<th>Title</th>
<th>Source</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face</td>
<td>Early Stage</td>
<td>Get the team together physically early-on</td>
<td>Managing a Virtual Team</td>
<td>Harvard Business Review</td>
<td>2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use face-to-face meetings strategically.</td>
<td>Top 6 Best Practices for Managing Virtual Teams</td>
<td>Corporate Education Group</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When and how often do we need to meet face-to-face (FTF)?</td>
<td>No office, no problem: 5 strategies for managing an all-virtual team</td>
<td>Fast Company</td>
<td>2014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Meet face-to-face at least once</td>
<td>Managing Virtual Teams: Ten Tips</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td>Initial</td>
<td></td>
<td>Make the first meeting face to face</td>
<td>Three tips for making virtual teams work</td>
<td>Harvard Business Review</td>
<td>2010</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level 1 Dimension</th>
<th>Level 2 Dimension</th>
<th>Specific Best Practice</th>
<th>Title</th>
<th>Source</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Sensitivity</td>
<td>Awareness</td>
<td>Increase cross-cultural awareness</td>
<td>Managing Virtual Teams: Ten Tips</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td></td>
<td>Priority cultural sensitivity</td>
<td></td>
<td>The Four Keys To Success With Virtual Teams</td>
<td>Forbes</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>You must arrive at decisions differently.</td>
<td></td>
<td>Five Things Every Virtual Manager Should Do</td>
<td>Forbes</td>
<td>2013</td>
</tr>
<tr>
<td>Time Zone</td>
<td>Treat time zones fairly</td>
<td>5 Tips for Virtual Collaboration</td>
<td>Forbes</td>
<td>2012</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B: Scree Plots

Figure 1. Outlier scree plot for Level 1 Best Practices.
Note. Correlations before the break in the slope were reviewed for possible exclusion. A break was detected between the seventh and eight correlation.
Figure 2. Outlier scree plot for Level 2 Best Practices.

Note. Correlations before the break in the slope were reviewed for possible exclusion. A break was detected between the seventh and eight correlation.
Figure 3. Distribution of the 85 correlations included in the meta-analysis for the Level 1 best practice-virtual team outcome relationship.

Note. Values on the x axis are the upper limit of a .05 band.
Figure 3. Distribution of the 92 correlations included in the meta-analysis for the Level 2 best practice-virtual team outcome relationship.

Note. Values on the x axis are the upper limit of a .05 band.