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TEAM TRUST AND TEAM PERFORMANCE: A META-ANALYSIS

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A DISSERTATION APPROVED FOR THE
GRADUATE COLLEGE

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Dedication

To Nana C.

Acknowledgements

This dissertation is about team trust and throughout the art of writing my own trust for the members of my team has developed. To pursue a doctorate degree abroad, especially through the deployments and relocations, is not an easy task. I am grateful to the many individuals who have, near and far, knowingly and not, contributed to this dream. Pursuing my doctoral degree has been a crucible learning experience, involving a time of great personal learning and development. This dissertation would not have been possible, and this experience would not have been enjoyable, without the many people I have been blessed to cross paths with.

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Abstract

This study systematically integrated empirical literature on the relationship between team trust and team performance focusing on real educational and organizational teams. A total of 84 empirical studies comprising 84 independent effect sizes involving a total of 5,582 teams met the inclusion criteria. Applying a random-effects model, the overall effect size between team trust and team performance was positive and moderate ($\bar{r}$ = 0.34). After correcting for measurement unreliability, the overall effect size increased ($\bar{r}_{\text{corrected}}$ = 0.40). The between-study heterogeneity was significant (Q = 385.30 [95% CI, p < 0.00), suggesting the existence of moderating variables. Nine potential moderating variables were examined including: team size (large versus small), team tenure (ad hoc versus intact), mode of communication (face-to-face versus virtual), task complexity (high versus low), study team setting (educational versus organizational), study age (early versus recent), cultural context of the sample (collectivistic versus individualistic), type of team performance measure (objective versus subjective) and operationalization of team trust (aggregation versus key informant). The results of these moderators are discussed along with the potential for publication bias. Limitations and suggestions for future research are also discussed.

Chapter 1: Introduction

Teams are prevalent within many modern organizations and are often charged with carrying out the most complex and important tasks that affect organizational viability including: strategic planning and decision-making, program development and implementation, and customer relations (see Tannenbaum, Mathieu, Salas & Cohen, 2012). In fact, scholars have indicated that teams are now the "basic building blocks" of modern organizations (Mathieu, Tannenbaum, Donsbach & Alliger, 2014, p. 131). Teams integrate diverse talent to achieve a common goal and emphasize flatter, more flexible work processes (Bennis & Biederman, 2007; Kozlowski & Ilgen, 2006). Senge (2006) suggested, "As the world has become more interconnected and business becomes more complex and dynamic, it is just not possible any longer to 'figure it out' from the top, and have everyone else following orders of the 'grand strategist'" (p. 4).

A *team* refers to two or more individuals who work together interdependently to achieve a common goal (Salas, Dickinson, Converse & Tannenbaum, 1992). The emphasis on utilizing teams in the workplace has been due in part to increased globalization and competition in the marketplace (Nahavandi & Aranda, 1994). For example, during the late 1980s, when U.S. automotive manufacturers faced significant market losses from Japanese competition, many redesigned operations to rely heavily on teams as a strategy to gain a competitive advantage. The widespread assumption is that teams can achieve something greater than individuals working alone (Hackman, 1990). Since the mid-1990s, the evolution of new communication technologies, outsourcing and alternative work arrangements have allowed organizations to implement virtual teams (Pauleen, 2004). A *virtual team* refers to members who are

geographically dispersed and must rely primarily or completely on computer-mediated communication such as e-mail, texting and video/audio conferencing (Lipnack & Stamps, 2008; Maznevski & Chudoba, 2000). Today, virtual teams have become commonplace in organizations. For example, a survey by the Society for Human Resource Management (SHRM) revealed that 66% of multinational organizations and 46% of all organizations rely on virtual teams (SHRM, 2012).

Research suggests that implementing teams can yield a number of benefits for both individuals and organizations (for reviews see Cohen & Bailey, 1997; Mathieu, Maynard, Rapp & Gilson, 2008; Salas, Stagl & Burke, 2004). These benefits include but are not limited to enhanced productivity, creativity, knowledge sharing and satisfaction among individuals, as well as increased decision-making quality and acceptance within the organization. Virtual teams offer these benefits, while also providing greater efficiency by reducing expenses for travel and office equipment (Geister, Konradt & Hertel, 2006; Lipnack & Stamps, 2008). An extensive body of research has documented, however, that many teams never reach their full potential (e.g., Allen & Hecht, 2004; Coutu & Beschloss, 2009; Hackman, 1990; Sims & Salas, 2007). For example, Thompson (2013) performed an extensive review of interdisciplinary research and reported:

> For every case of team success, there is an equally compelling case of team failure. Teams can outperform the best member of a group, but there are no guarantees. Admitting the inefficiency of teams is hard, especially when most of us would like to believe the Gestalt principle that the whole is greater than the sum of its parts. Teams are not a panacea for

organizations; they often fail and are frequently overused or poorly designed. (p. 12)

Therefore, team performance is a matter of importance for scholars and practitioners alike. The question becomes, how can team performance be enhanced? Interestingly, while a number of factors (e.g., improved communication, better planning, more leadership support, proper training) have been examined in an attempt to answer this question, trust within the team or *team trust*[1] has been increasingly suggested as critical for effective team performance (e.g., Bijlsma-Frankema, de Jong & de Bunt, 2008; de Jong & Elfring, 2010; Hakanen, Häkkinen & Soudunsaari, 2015; Salas, Sims & Burke, 2005; Webber, 2008b).

Background

Trust refers to a *willingness to be vulnerable* in an interdependent relationship (Mayer, Davis & Schoorman, 1995), and team trust refers to a *shared perception of trust* in a team in whole (Costa & Anderson, 2011; de Jong & Elfring, 2010; Langfred, 2004). Considering trust as a shared belief, trust is expected to emerge from the team in terms of membership in a shared social system in which, in effect, shared experiences and norms of the team can bring about expectations in the team in whole (Creed, Miles, Kramer & Tyler, 1996; McKnight, Cummings & Chervany, 1998; Shamir & Lapidot, 2003; Williams, 2001). The existence of a shared goal or a collective purpose, for instance, can build a sense of connection and provide members with common values and a shared way of thinking about relationships and processes within the team. This is

[1] Team trust has also been commonly referred to as *group trust*, *intrateam trust*, *collective trust*, *mutual trust*, and simply, *trust.*

to suggest that team trust is a team-level (i.e., aggregated) concept and therefore, it is an emergent property of a team as opposed to a belief held by an individual team member (Bijlsma-Frankema et al., 2008; de Jong & Elfring, 2010; Forsyth, Adams & Hoy, 2011; Langfred, 2004; Simons & Peterson, 2000). This current study focuses on team trust as a team-level concept.

According to Dirks (1999), trust is generally expected to promote cooperation, thereby enhancing a team's performance. Due to the inherent interdependence of teamwork, shared perceptions of trust are often posited to have a positive relationship with team performance (e.g., Costa, Roe & Taillieu, 2001; Hempel, Zhang & Tjosvold, 2009; Palanski, Kahai & Yammarino, 2011). This implies that higher team trust will be associated with higher team performance. On the other hand, a moderate to high level of trust between team members can also promote a range of negative behaviors and attitudes. For example, too much trust can engender complacency, groupthink and reduced monitoring behaviors, all of which can limit the effectiveness of working relationships (e.g., Gargiulo & Ertug, 2006; Janis, 1982; Kovač & Kristiansen, 2010). Team trust has also been found to be related to lower team performance (e.g., Dirks, 1999; Langfred, 2004). Therefore, trusting relationships, especially those developed between members of a work team, can be imperative to an individual's ability to achieve his or her share of the team's task (Golembiewski & McConkie, 1975).

Over the past two decades, there has been a surge of interest among researchers in the area of trust in organizations (Colquitt & Rodell, 2011). A title search for "trust" in the PsycINFO database, for instance, revealed that the number of articles published on the topic of trust in organizations gained momentum in the mid-1990s and has

continued to climb since (see Figure 1). In addition to numerous books, journal articles and conference proceedings which focus on trust, 10 special issues of major journals have been devoted to the topic[2]. Furthermore, the *Journal of Trust Research* was introduced in 2011, providing additional evidence for the upsurge of scholarly interest in trust in recent years.

A multilevel narrative review of trust literature noted that, while the focus of much of this research has been at the individual level, team trust has become a "newly developed area" (see Fulmer & Gelfand, 2012, p. 1196). Within this area of inquiry, several empirical studies have examined the relationship between team trust and team performance. Despite general optimism surrounding the concept of trust, a few studies have mentioned that empirical findings associated with the team trust-team performance relationship are "mixed" (Hakonen & Lipponen, 2009, p. 19), "inconsistent" (Rao, 2015, p. 7) and "inconclusive" (DeOrtentiis, Summers, Ammeter, Douglas & Ferris, 2013, p. 521). Thus, questions remain regarding the overall *direction* (positive or negative) and *strength* of the relationship between team trust and team performance, as well as whether this relationship is significantly moderated by team and study design variables.

[2] These special issues include the following: the *Academy of Management Review* (1998 & 2009), *Organization Studies* (2001), *Journal of Strategic Information* (2002), *International Journal of Human Resources Management* (2003), *Organization Science* (2003), *Personnel Review* (2003), *Resources Management* (2003), *International Studies of Management and Organization* (2003) and *Journal of Management* (2008).

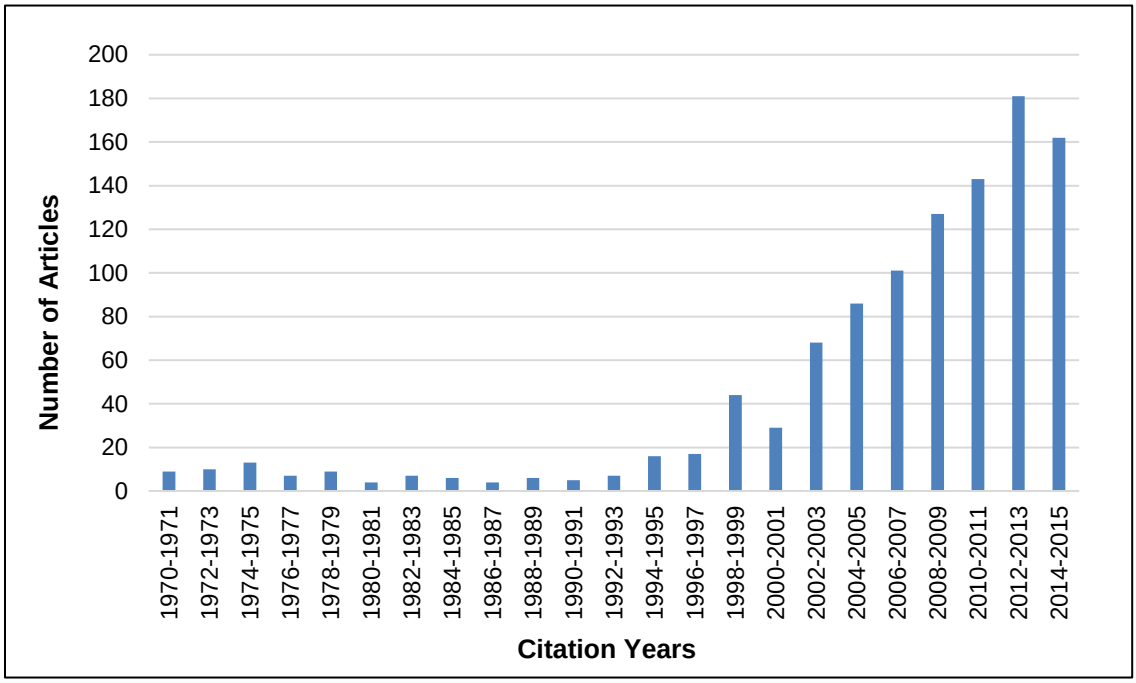


Figure 1. Articles on 'Trust' in PsycINFO. Data was retrieved through a title-based search using the term "trust" along with six classifications on interpersonal trust including: social psychology, group and interpersonal processes, organizational behavior, cognitive processes, educational psychology and general psychology. Search results were further limited to peer-reviewed studies in the English language.

Problem Statement

Following their review of organizational trust literature, Fulmer and Gelfand (2012) suggested that "more diverse research methods are needed in the study of trust to illustrate the *convergence* [emphasis added] of research findings" (p. 1214). The present study addresses this issue through a meta-analysis of the relationship between team trust and team performance. A meta-analysis systematically converges or integrates past research findings to arrive at a sample-size weighted mean effect size (Lipsey & Wilson, 2001). The result is both a better understanding of the overall relationship between two variables as well as variables that moderate a relationship (Lipsey & Wilson, 2001). To date, there have been three meta-analyses examining the relationship

between team trust and team performance (see Breuer, Hüffmeier & Hertel, 2016; de Jong, Dirks & Gillespie, 2016; and Maguin, 2010). The first two of these meta-analyses were completed after the present study was commenced and are forthcoming in the *Journal of Applied Psychology*. Despite their many strengths, each of these meta-analyses also has limitations that potentially obscure their results as described below. Table 1 presents an overview of the key characteristics of these meta-analyses in comparison to the present study.

In 2010, Maguin conducted a meta-analysis as part of her Master's thesis entitled, "A meta-analysis of interpersonal trust and team performance." She corrected effect sizes for measurement error and applied a random-effects model. The overall results suggested that team trust had a positive, yet weak, relationship with team performance ($\bar{r}_{\text{corrected}} = 0.19$). Maguin (2010) also found that mode of communication (face-to-face versus virtual) and type of team performance measure (objective versus subjective) were significant moderators of the relationship. In terms of limitations, Maguin (2010) herself concluded that these results may not be very accurate due to inclusion of dependent data (i.e., using multiple results from the same study), inclusion of only a limited number of studies in the analysis ($k = 13$), and lack of incorporation of data from up-to-date publications in the analysis. Indeed, the publication year of the most recent study included in her meta-analysis was 2004.

In April 2016, de Jong and colleagues conducted a study entitled, "Trust and team performance: A meta-analysis of main effects, moderators and covariates." They included studies conducted at the team level, as well as studies that had enough data to calculate team-level effect sizes. Like Maguin (2010), they corrected for measurement

unreliability and applied a random-effects model. The results of their meta-analysis indicated that: (a) the overall relationship between team trust and team performance was positive and moderate ($\bar{r}_{\text{corrected}} = 0.30$); and (b) team design variables were significant moderators of the team trust-team performance relationship. Specifically, task interdependence (high versus low), skill differentiation (high versus low) and authority differentiation (high versus low) were significant team design factors.

By synthesizing results from 100 studies involving a total of 6,748 teams, de Jong et al.'s (2016) meta-analysis represents a major integration of the literature. At the same time, such comprehensiveness was achieved in part by comparing conceptually different constructs which limits the generalization of findings in meta-analysis; this issue is referred to as "mixing apples and oranges" by Lipsey and Wilson (2001). In particular, the authors grouped together several outcomes to represent the criterion of interest, ostensibly labeled as "team performance." This performance criterion represented outcomes as disparate as team quality, innovation, cost savings, customer satisfaction, timeliness and organizational performance as a proxy for team performance. Despite the multiple criteria of interest, the authors did not analyze each outcome separately in association with team trust. Furthermore, de Jong et al. (2016) broadened their meta-analysis by treating teams and team-like structures as equivalent. Team-like structures are larger units (e.g., schools, districts, firms) in which employees may feel a sense of camaraderie with other employees in the unit, yet the units themselves are not typically considered teams in practice. For instance, one study included in the meta-analysis had a sample size of 148 "firms" rather than teams; the firms had an average size of 136 employees (see Dai & Chok 2014 in de Jong et al.,

2016). In contrast, teams generally have only about 15 members (Thompson, 2013), which casts doubt to whether team-like structures are comparable to teams. Lastly and perhaps most troublesome, de Jong et al. (2016) compared studies using different research designs. In particular, the authors analyzed data from laboratory (experimental) studies combined with data from natural field studies, but calculated just one effect size between the two types of studies. Experimental studies involve teams created only for the purpose of a study, whereas field studies involve real work teams performing real organizational tasks. Experimental studies manipulate variables of interest (e.g., levels of trust) and often involve simple tasks (e.g., building blocks, completing a puzzle) that tend to last a very short duration (e.g., 30 minutes). On the other hand, field studies do not purposefully manipulate variables, and team members tend to be involved in more intense and long-term shared efforts. According to Lipsey and Wilson (2001), research design should be examined as a potential moderating variable due to fundamental differences that are likely to affect research results. Indeed, the forthcoming meta-analysis by Breuer et al. (2016) found that research design significantly moderated the relationship between team trust and team performance such that the relationship was stronger with field than experimental studies.

Also in 2016, a study by Breuer and colleagues entitled, "Does trust matter more in virtual teams? A meta-analysis of trust and team effectiveness considering virtuality and documentation as moderators" was pre-published. Breuer et al. (2016) assessed the relationship between team trust and eight criteria of interest that were grouped into three distinct categories: attitudes, information processing and performance (see Table 1). The authors did conduct a separate analysis for each criterion of interest and category.

After correcting for measurement unreliability and applying a random-effects model, Breuer et al. (2016) found a slightly weaker effect size for the relationship between team trust and team performance than reported by de Jong et al. (2016) ($\bar{r}_{\text{corrected}} = 0.27$ versus $\bar{r}_{\text{corrected}} = 0.30$, respectively). They also found that mode of communication (face-to-face versus virtual) significantly moderated the relationship, which is in contrast to the finding reported by de Jong et al. (2016).

One possible explanation for these differences is that the findings of Breuer et al. (2016) were based on significantly fewer studies than the findings of de Jong and colleagues (2016) ($k = 52$ versus $k = 100$, respectively). The studies included in the meta-analysis by Breuer et al. (2016) overlapped with those utilized by de Jong et al. (2016), with the exception of eight studies, one of which was retracted after publication[3]. In this instance, less stringent quality control standards were imposed by Breuer et al. (2016). Another possible explanation for the differing results is that Breuer et al. (2016) combined effect sizes from mixed (i.e., individual and team) levels of analysis, rather than maintaining the team-level of analysis as was done by de Jong et al. (2016). Specifically, some studies included in Breuer et al.'s (2016) meta-analysis utilized samples comprised of individuals (e.g., Iacono & Weisband, 1997; Jarvenpaa, Shaw & Staples, 2004), whereas others have utilized samples comprised of teams (e.g., Hempel et al., 2009; Joshi, Lazarova & Liao, 2009). It can be problematic to accurately synthesize effect sizes computed at different levels of analysis because results are likely to be stronger at the team than individual level (see Gully, Incalcaterra, Joshi &

[3] See Walumbwa, F.O., Luthans, F., Avey, J.B., & Oke, A. (2011). Retracted: Authentically leading groups: The mediating role of collective psychological capital and trust. *Journal of Organizational Behavior*, *32*(1), 4-24.

Beaubien, 2002). Therefore, by including some studies conducted at the individual level, the results of Breuer et al.'s (2016) meta-analysis are likely to be underestimated.

In sum, two meta-analyses (by Breuer et al., 2016; and de Jong et al., 2016) were conducted that are up-to-date quantitative syntheses of studies examining the team trust-team performance relationship. Despite their methodological differences, the general conclusion from these meta-analyses is that the overall relationship between team trust and team performance is positive, moderate and highly variable based on a number of moderating variables. It is challenging, however, to apply such a generalization to organizational teams given that both Breuer et al. (2016) and de Jong et al. (2016) included a mixture of teams (e.g., athletic, military/combat, team-like structures, educational, organizational, experimental) in their studies, without coding for the differences between these team types or team settings.

The current meta-analysis addresses limitations of the previous and forthcoming meta-analyses by restricting the scope of included studies to only those based on teams formed in real educational and organizational settings. Furthermore, the current study focuses on the relationship between team trust and team performance at only the team-level of analysis. Although de Jong et al. (2016) also focused on the relationship at this level, as suggested previously, their meta-analysis utilized very broad inclusion criteria and therefore, the clarity of their results are suspect. In contrast, the current meta-analysis examines team trust in association with only one criterion—team performance. *Team performance* refers to the quality or success of a team's decision, service or product (Wageman, Hackman & Lehman, 2005). In addition, this current meta-analysis focuses on teams; it excludes team-like structures. Therefore, this study has

conservative inclusion criteria as well as slightly different coding procedures, which are discussed further in this study. These alternate coding procedures may yield somewhat different results than the forthcoming meta-analysis by de Jong et al. (2016). Furthermore, the current meta-analysis includes six moderators (see Table 1) and 17 additional studies that have not been examined by any previous or upcoming meta-analyses on the topic.

Study Purpose

The purpose of the current study is to examine the overall direction and strength of the relationship between team trust and team performance. This study utilizes past empirical findings from studies published from 1996 to 2016 pertaining to the topic. Furthermore, this study examines the potential moderating influence of nine variables including: team size (large versus small), team tenure (ad hoc versus intact), mode of communication (face-to-face versus virtual), task complexity (high versus low), study team setting (educational versus organizational), study age (early versus recent), cultural context of the sample (collectivistic versus individualistic), type of team performance measure (objective versus subjective) and operationalization of team trust (aggregation versus key informant). This study also analyzes the prevalence and potential impact of publication bias or missed studies in this meta-analysis.

Table 1. Meta-analyses involving team trust-team performance relationship

Study	Level of analysis	Criterion variable(s)	Moderators			No. of studies	No. of teams	Study dates
			Team design	Study design	Measurement procedures			
Maguin (2010)	Individual and team	Performance	1		2	13	1,004	1996-2004
de Jong, Dirks & Gillespie (2016)	Team	Mixture of performance and other outcomes	1, 3, 4, 5, 6		2, 7, 8	100	6,748	1996-2015
Breuer, Hüffmeier & Hertel (2016)	Individual and team	*Attitudes:* satisfaction, cohesion, effort and commitment *Information processing*: knowledge sharing and learning *Performance*: task and contextual performance (citizenship behaviors)	1, 9	11, 12	2, 10	52	1,850	1991-2013
Morrissette (2016)	Team	Performance	1, 3, 13, 14	15, 16, 17	2, 18	84	5,529	1996-2016

Note. 1 = mode of communication (face-to-face, virtual); 2 = type of team performance measure (objective, subjective); 3 = team tenure (ad hoc, intact); 4 = task interdependence (high, low); 5 = skill differentiation (high, low); 6 = authority differentiation (high, low); 7 = dimension of performance (effectiveness, efficiency); 8 = referent of team trust (trust in team, trust in teammates); 9 = documentation of interactions (high, low); 10 = survey source (same, different individual); 11 = study design (cross-sectional, longitudinal); 12 = study setting (field, lab); 13 = team size (large, small); 14 = task complexity (high, low); 15 = study team setting (educational, organizational); 16 = study age (early, recent); 17 = cultural context of the sample (collectivistic, individualistic); 18 = operationalization of team trust (aggregation, key informant)

Chapter 2: Literature Review

Definition of Trust

Trust is commonly defined as a willingness to be vulnerable while also being confident and holding positive expectations regarding another party (see Colquitt & Rodell, 2011; Colquitt, Scott & LePine, 2007). Mayer, Davis and Schoorman's (1995) definition of trust is perhaps the most widely cited; they define trust as:

> The willingness of a party 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. (p. 712)

This definition suggests that the concept of trust involves two key elements including: the *willingness to be vulnerable* and an *expectation*. First, although not explicitly acknowledged in all trust definitions, scholars generally agree that the willingness to be vulnerable or intention to take a risk in a relationship is central to the concept of trust (Kramer, 1999; Rousseau, Sitkin, Burt & Camerer, 1998). Being vulnerable implies that there is a potential for loss and disappointment in a relationship. For example, when individuals work together in a team, each team member risks that one or more of the other members will fail to make a fair and equitable contribution to the team's task. Second, trust includes an expectation or belief regarding the behaviors or intentions of another party. This implies that trust is being conceptualized here as a cognitive state (a belief), as opposed to a type of behavior or personality trait.

Role of Trust

Antecedents of Trust

After defining the concept of trust, it is also important to understand the role of trust in organizations. The most popular framework for guiding trust research is the *Integrative Model of Organizational Trust* (see Figure 2) proposed by Mayer and colleagues (1995). This theoretical model of organizational trust posits that trust develops between two interdependent parties, a trustor and trustee. The term *party* may refer to an individual or a collective (Costa, Bijlsma-Frankema & de Jong, 2009; Schoorman, Mayer & Davis, 2007; Schoorman, Wood & Breuer, 2015). Therefore, the trust model presented below can be utilized for understanding the antecedents and consequences of trust in teams as well as in organizations.

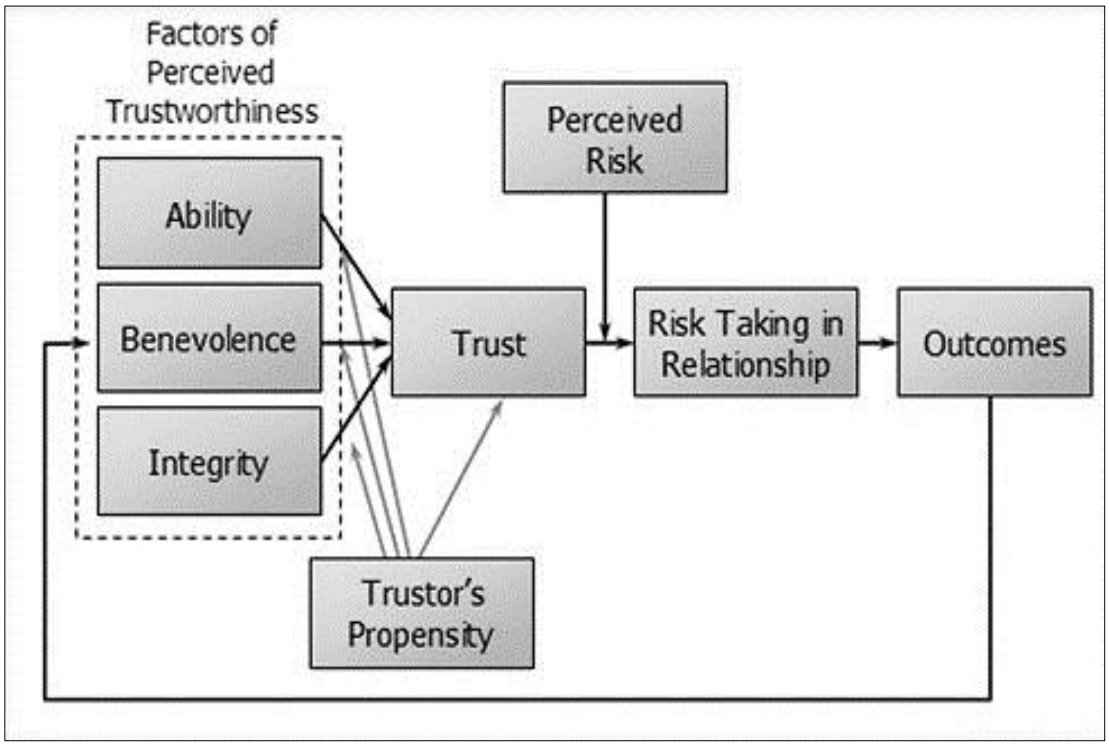


Figure 2**. Integrative model of organizational trust (from Mayer et al., 1995)**

It is important to clarify how trust develops in a relationship. As suggested by Mayer et al.'s (1995) model, trust is expected to develop from *perceived trustworthiness* or beliefs regarding the benevolence, ability and integrity of another party. *Benevolence* refers to the extent to which a trustee displays care and concern. *Ability* refers to the extent to which a trustee is competent and skilled. Lastly, *integrity* refers to the extent to which a trustee is reliable and predictable in words and actions (Mayer et al., 1995). Indeed, a review of existing trust and trustworthiness measures by McEvily and Tortoriello (2011) suggested that most measures contain these elements.

The model by Mayer and colleagues (1995) further proposes that trust also develops as a function of a trustor's propensity to trust. *Propensity to trust* refers to an individual's natural inclination to trust other people in general (Mayer et al., 1995). In other words, it is a generalized trust for people in society with no specific referent party. This implies that the propensity to trust is a stable dispositional characteristic or personality trait of a trustor. Scholars (e.g., Schoorman et al., 2007) explained that prior to the mid-1990s, the widely accepted view of trust was as a personality trait. In contrast, to be clear, this study focuses only on trust conceptualized as a cognitive state.

Consequences of Trust

The theoretical explanations for how trust leads to performance in organizations have been criticized as scarce (see Bijlsma-Frankema et al., 2008). The model by Mayer et al. (1995), however, has significant implications regarding the trust-performance association. Namely, the model proposes that trust leads to outcomes in organizations through risk-taking in a relationship. *Risk-taking* is the "behavioral manifestation of trust" (Mayer et al., 1995, p. 726), which is trust as a behavior. The difference between

trust and trusting behaviors is that trust involves an intention to take a risk whereas trusting behavior is actually engaging in a risky action (Mayer et al., 1995). In the literature, trusting behavior is generally operationalized as cooperative actions, such as a leader delegating an important task to a follower or sharing confidential information (Colquitt et al., 2007; Lewicki, Tomlinson & Gillespie, 2006). Additionally, this association between trust and outcomes may be influenced by context or factors external to a relationship.

Although contextual factors, such as the design of a social system, may influence the trust-performance relationship, they have received limited attention in the literature. Considerably more research is needed in this area to understand the factors that may alter the direction and strength of the relationship between trust and performance. The key factors that may potentially moderate the general relationship between team trust and team performance will be reviewed below in some detail.

Hypotheses

Overall Relationship

The recent meta-analyses by Breuer et al. (2016) and de Jong et al. (2016) focused on the overall relationship between team trust and team performance. The study by de Jong et al. (2016) focused on integrating past research on the topic at the team level and many of the studies included were conducted in the organizational domain, including business and educational teams. In addition, many studies included in de Jong et al.'s (2016) meta-analysis examined team trust in association with the specific outcome of team performance. Therefore, despite methodological differences, results of the current study are likely to show the same overall direction of the relationship

between team trust and team performance as was found by de Jong and colleagues (2016). Thus, this study hypothesizes that:

H1: Team trust will be positively associated with team performance.

Potential Moderators

Design of the Team

Team size. An examination of the moderating influence of team size is critical because it can have important consequences for different functions of teams, such as communication, motivation to work, trust, performance and satisfaction (Thomas & Fink, 1963; Katzenbach & Smith, 1993). When individuals are involved in contexts where members must work together toward a common goal, it underscores the importance of processes. Unfortunately, large teams are often associated with Steiner's (1972) theory of process loss. Steiner (1972) suggested that individuals in larger groups are likely to put forth less work effort because they experience greater coordination challenges (e.g., confusion about work assignments). An implication is that larger teams may also face relational loss, in which developing and maintaining strong, trusting relationships may be more difficult the greater the number of members of a team. More modern theorizing suggests, however, that when teams are challenged by structural issues, team members put forth greater effort early on in a team's formation to enhance interdependency and cohesion among team members to help overcome these problems (e.g., Jarvenpaa & Leidner, 1998). This is a process that may feed back to form even stronger trusting relationships between team members. It is therefore hypothesized that:

H2: Team size will significantly moderate the relationship between team trust and team performance such that the relationship will be stronger for large as opposed to small teams.

Team tenure. Team tenure refers to the length of time the team members have been together as a team. Team tenure is a structural variable that is often examined as a moderator in meta-analyses dealing with teams (e.g., Bell, Villado, Lukasik, Belau & Briggs, 2010; Stahl, Maznevski, Voigt & Jonsen, 2010). As team members get to know each other, their level of trust in each other is apt to change. De Jong et al. (2016) found that team tenure[4] was not a significant moderator of the team trust-team performance relationship. On the other hand, de Jong et al. (2016) coded team tenure to include both past and expected future time together as a team. In contrast, the current study does not include anticipated future time together as a team. Thus, this study utilizes more conservative coding for this variable than did de Jong et al. (2016). In particular, the current study relies on the social exchange theory (see Blau, 1964), which suggests that trust develops over time through repeated exchanges or interactions (e.g., sharing of information). Based on social exchange theory, therefore, it is reasonable to expect that recurring interaction increases team members' emotional closeness and trusting relations. It is therefore hypothesized that:

H3: Team tenure will significantly moderate the relationship between team trust and team performance such that the relationship will be stronger for intact as opposed to ad hoc teams.

[4] de Jong et al. (2016) referred to team tenure instead as *temporal stability*.

Mode of communication. Mode of communication refers to a team's primary method of communication, whether that be face-to-face or virtual. In general, reliance on computer-mediated communication provides limited nonverbal cues such as gestures and facial expressions (Daft & Lengel, 1986), which are considered to be useful for the development of trust and shared understandings (Zolin, 2002; Zolin & Hinds, 2007). A virtual team may develop trust early on in its existence to overcome these challenges (commonly referred to as *swift trust*), which suggests that trust is likely to be higher in these teams (Jarvenpaa & Leidner, 1998). In support of this idea, two meta-analyses on the topic (by Breuer et al., 2016; and Maguin, 2010) found that the relationship between team trust and team performance was stronger for virtual than face-to-face mode of communication and therefore, this meta-analysis explores this possibility as well. It is therefore hypothesized that:

> *H4: Mode of communication will significantly moderate the relationship between team trust and team performance such that the relationship will be stronger with virtual as opposed to face-to-face mode of communication.*

Task complexity. Task complexity refers to the amount of knowledge and effort required to complete the task. Akgün, Byrne, Keskin, Lynn and Imamoglu (2005) argued that as tasks increase in complexity, there is a greater need for interdependence among team members because teams must search for and evaluate information. Further, dependence on another party for task completion may increase the willingness to be vulnerable in a relationship (Morris & Moberg, 1994). The implication is that higher task complexity may be associated with higher levels of trust in relationships. In addition to this theorizing, a study by Dayan and Di Benedetto (2010) has examined the

moderating influence of task complexity on the relationship between team trust and team performance. This study found that higher than lower complexity tasks significantly moderated the relationship. It is therefore hypothesized that:

H5: Task complexity will significantly moderate the relationship between team trust and team performance such that the relationship will be stronger when tasks are high as opposed to low in task complexity.

Study Design

Team setting. Team setting refers to the context within which the team operates. For the current study, team setting is operationalized as whether the teams sampled in a given study operated in an educational or organizational setting. Team researchers suggest that the context in which teams operate is crucial in understanding team interactions and performance (e.g., Sundstrom, McIntyre, Halfhill & Richards, 2000). On this topic, Castaño, Watts and Tekleab (2013) suggested that educational teams are likely to be less cohesive than organizational teams because they tend to interact for shorter periods of time than do teams in organizational settings. Also, Castaño et al. (2013) suggested that this effect may be due to the higher stakes tied to completing (or failing to complete) an assigned task within an organizational team. Therefore, it may be the case that members of organizational teams put forth more effort to develop cohesive and trusting relationships with other team members because they have more to lose than do members of educational teams. It is therefore hypothesized that:

H6: Team setting will significantly moderate the relationship between team trust and team performance such that the relationship will be stronger for organizational as opposed to educational teams.

Study age. A potential moderating variable in a meta-analysis of the relationship between team trust and team performance is the age of a study. Study age is a potential moderator because the topic of trust within teams has grown in importance over time and therefore, these perceptions might be manifested within the surveys that are collected by researchers. People's perceptions of trust are also likely to be highly related to the practical issues in society. Scholars have indicated that the result of several high-profile corporate scandals (e.g., Enron, WorldCom), which eventually led to the failure of these organizations, has subsequently led to a public call for more trustworthy organizational behavior (e.g. Pearsall & Ellis, 2011). In light of the organizational breaches in trust with shareholders and employees that have undermined public confidence, in his 2009 State of the Union Address, President Barack Obama stated that Americans were suffering from a "deficit of trust" (Kramer & Lewicki, 2010). To address this issue, Congress has enacted new regulations to promote greater trustworthiness in organizational practices. Policies of an organization might affect people's perceptions of trust in their teams. On the one hand, employees may have less trust for the teams in which they are embedded because they are weary due to past corruption and trust issues. It seems much more plausible, however, that trust issues in society have made the topic of trust more important and sought after by team members in organizational settings. Thus, study age (as operationalized by publication year) is expected to moderate the team trust-team performance relationship. In particular, studies were assigned to be "recent" if they were published from 2011 to 2016, and "early" if they were published from 1996 to 2005. These two subgroups were selected in an effort to reflect the pre and early corporate scandal years, and then the recent

subgroup was selected to capture the time after President Obama made his declaration for more trust in society. It is therefore hypothesized that:

H7: Study age will significantly moderate the relationship between team trust and team performance such that the relationship will be stronger for recent as opposed to early studies.

Cultural context of the sample. The culture in which teams reside may influence team member behaviors and perceptions of trust. Cultural context refers to aspects of national culture including shared beliefs, norms, traditions and values that distinguish the members of one society from those of another (Hofstede, 2001). One important cultural factor is the difference between individualistic and collectivistic cultures. In general, people from individualistic cultures (e.g., U.S., Germany) tend to be independent and display less group loyalty; they tend to prioritize personal over collective goals. People in collectivistic cultures (e.g., China, Japan), on the other hand, tend to be more interdependent and group-oriented; they tend to prioritize team over personal goals (Hofstede, 2001). This study therefore argues that individuals and teams within collectivistic cultures are likely to be prone to rely on cooperative, trust-based relationships. It is therefore hypothesized that:

H8: Cultural context of the sample will significantly moderate the relationship between team trust and team performance such that the relationship will be stronger for collectivistic as opposed to individualistic cultures.

Measurement of Key Variables

Type of team performance measure. The specific measures of team performance utilized by a researcher to assess the quality of output of a team can

influence how large an effect will be revealed in a study. Objective assessments of team performance refer to factual indicators, such as simulation game points and number of ideas generated on a brainstorming task. On the other hand, subjective assessments of team performance include personal interpretations of team performance, such as grades for an educational writing assignment and scores from team performance surveys. Each type of measure can provide important information regarding a team's functioning. Because subjective team performance measures are more open to bias in which individuals tend to rate themselves (or their team) more favorably than unfavorably (Podsakoff & Organ, 1986), the relationship between team trust and team performance is likely to be stronger when based on subjective than objective team performance measures. All meta-analyses on the topic (Breuer et al., 2016; de Jong et al., 2016; Maguin, 2010) have indeed found that the relationship is significantly stronger for subjective measures. It is therefore hypothesized that:

> *H9: Type of team performance measure will significantly moderate the relationship between team trust and team performance such that the relationship will be stronger for studies utilizing subjective as opposed to objective measures.*

Operationalization of team trust. Most empirical studies in this meta-analysis aggregated individual scores on a team trust survey and thus, obtained a mean score for the team trust variable. Less commonly, studies arrived at a generalized perception of team trust through the use of a key informant, often a team leader who responded to the measure of team trust on behalf of the team. Typically, aggregated measures are expected to reduce the biases associated with the use of a key informant. In contrast, a

specific key respondent may provide overly favorable responses to make the team "look good." It is therefore hypothesized that:

> *H10: Operationalization of team trust will significantly moderate the relationship between team trust and team performance such that the relationship will be stronger for studies utilizing a key informant as opposed to an aggregated measure of team trust.*

Chapter 3: Methodology

Literature Search

To identify potentially relevant articles, this study utilized several search strategies. First, an electronic search was carried out utilizing various databases (e.g., PsycINFO, Dissertation Abstracts, ERIC, ProQuest, Google Scholar) with the date of the last search conducted in July 2016. In this search, the following key terms were combined: "*team trust"* OR "*group trust*" OR "*intrateam trust*" OR "*intragroup trust*" OR "*collective trust*" OR "*mutual trust*" OR "*trust in team*" AND "*team performance*" OR "*group performance*" OR "*team effectiveness*" OR *"group effectiveness*." Second, a further electronic search was undertaken for conference papers published by the *Academy of Management, Society for Industrial and Organizational Psychology* and *American Psychological Association*. Third, additional articles were identified by scanning the reference sections of potentially relevant studies identified with the first two methods. Finally, this study reviewed previous and forthcoming meta-analyses on the team trust and team performance relationship (Breuer et al., 2016; de Jong et al., 2016; Maguin, 2010), as well as the narrative review by Fulmer and Gelfand (2012). These literature search processes yielded a pool of approximately 1,100 studies. Further examination of the abstracts and method sections of these studies narrowed the pool of studies for potential inclusion in this meta-analysis to 204 studies.

Criteria for Inclusion

To be included in the current meta-analysis, studies had to meet seven specific inclusion criteria. First, a study's constructs had to be measured in line with this study's definitions of "trust" and "team performance." Second, meta-analysis applies only to

quantitative research studies and therefore, qualitative studies were excluded. Accordingly, studies must have reported a statistic (preferably, a correlation coefficient) for quantifying the relationship between team trust and team performance. In a few cases (studies by Baruch & Lin, 2012; and Donati & Zappalà, 2013), this information was not reported but was made available after contacting the study authors. Third, only studies that measured team trust at the team level were included. Studies that reported only data at the individual level or organizational level for the predictor variable were excluded. Fourth, only studies that examined the team's trust *in the team* were included. Studies that reported only data pertaining to other referents (e.g., the team's trust in their leader or toward another team) for the predictor variable were excluded. Fifth, only studies that assessed real educational and organizational teams were included. Studies that examined other team types (e.g., athletic, military/combat, experimental) were excluded. Sixth, only studies that were original works were included. Studies that were based on data that had been published at an earlier timeframe were excluded. Lastly, only studies in the English language were included.

Coding Procedures

To facilitate the extraction of data from each study, the author of this meta-analysis developed an Excel-based coding form (see Appendix A). Each study was then coded on the following characteristics: team location(s); study setting (educational or organizational); team type (action, decision, project or mixed); average team size; average team tenure; mode of communication (face-to-face or virtual); type of team performance measure (objective, subjective or both); estimates of reliability for each team trust and team performance; sample size (total number of teams); and effect size

for the relationship between team trust and team performance. Other information for potential moderator analysis was coded including: study age (early, mid or recent) and operationalization of team trust (aggregation, key informant or group forum). Each study was read several times by the author of this study and coded at least three times during the course of data extraction to enhance intrarater reliability.

To assess replicability of coding by the author of this study, an additional coder was utilized. The additional coder was a Master's-level graduate student in a related discipline. The additional coder independently coded information from 29 randomly-selected studies (34.5%), which included a total of 29 effect sizes. Before this coding effort, the additional coder was provided a coding manual designed by the author of this study (see Appendix B), which detailed how study characteristics were to be operationalized and assessed. Five of the 29 randomly-selected studies were coded initially to assess interrater agreement and allow for clarification of the coding instructions. Interrater agreement between the coders for the 29 randomly-selected studies was high (93%); 80% is the minimum acceptable interrater reliability (McHugh, 2012). Therefore, the raters' agreement score exceeded minimum standards. Disagreements mainly occurred for task complexity (operationalized by team type), average team tenure and reliability coefficients for team trust measures (see Table 2). Unclear or inadequate descriptive information provided by study authors and, to a lesser degree, reading errors contributed to the disagreements. These and other discrepancies were resolved by each coder re-examining the studies with coding discrepancies and then, the coders discussing the potential sources of discrepancies until they were able reach consensus on coding.

Table 2. Interrater agreement for key study variables

Variable	Percent of Agreement
Team location	100%
Team setting	100%
Task complexity (operationalized by team type)	79.3%
Average team size	96.6%
Average team tenure	82.8%
Mode of communication	100%
Type of team performance measure	97.1%
Reliability r_{xx}	85.7%
Reliability r_{yy}	97.1%
N (total number of teams)	93.1%
Effect size	94.3%
Total	**93.3%**

In the coding process, several coding decisions had to be made given some studies reported little or no descriptive information on specific variables such as task complexity. Although the complexity of a task is an important variable to consider, this variable was rarely fully described by the primary studies. Therefore, this study coded for task complexity by utilizing the classification scheme developed by De Dreu and Weingart (2003), which relied on type of team as a proxy for task complexity. Specifically, each study was coded as involving one of the following types of teams: action, decision-making, project or mixed (i.e., studies that assessed a combination of the previously identified team types). Specific descriptions of each team type are presented in the coding manual provided in Appendix B.

Following this procedure, team types were assigned to a level of task complexity—low, medium, high or mixed. Specifically, studies assessing action teams were coded "low" in task complexity, those assessing decision-making teams were

coded as “medium,” those assessing project teams were coded as “high,” and those studies which assessed a mixture of the previously identified team types were coded as “mixed.” Although task complexity was coded into four levels, only the two levels of high and low task complexity were assessed in the moderator analysis. Furthermore, the present study’s coding of interest was in the two extreme levels of each moderator. Therefore, the middle or moderate levels as well as the combination levels (i.e., “both” and “mixed” categories) for all other categorical moderators were excluded from the analysis.

In addition, this study had to make coding decisions about moderator levels (e.g., large versus small team size, ad hoc versus intact team tenure). Essentially, the levels for these variables were established with some consideration to previous team meta-analyses (e.g., Bell et al., 2010; Castaño et al., 2013) along with referencing team textbooks (e.g., Thompson, 2013). In the present study, teams were coded as “large” if they had 10 or more members, and “small” if they had two to four members. In addition, teams were coded as “ad hoc” if team members had been together as a team for less than one year, and “intact” if team members had been together as a team for greater than or equal to one year.

This study also made coding decisions for studies that reported multiple effect sizes for the same constructs based on the same study sample. Typically, the primary studies presented an effect size for the relationship between team trust and team performance at one point in time. When a study reported effect sizes for the relationship at multiple time points, only the effect size for the final time point was coded to ensure statistical independence of the data. For example, if team members were surveyed for

their perceptions of team trust at the start of the team project at Time 1 and then again at the project's completion at Time 2, only the effect size for Time 2 was coded. Likewise, if team performance was assessed half-way through the team's project and then again at the project's completion, only the final effect size for the completed task was coded.

Along with this, most of the primary studies reported either a subjective or an objective measure of team performance. When a study reported both types of team performance measures, only the effect size associated with the objective measure was coded. If two subjective team performance measures were reported, only the effect size associated with the measure deemed to be the most objective was coded. In the study by Crisp and Jarvenpaa (2013), subjective and objective measures were combined into a single effect size by the authors, as opposed to a separate effect size for each type of team performance measure. Therefore, the type of team performance measure for this study was coded as "both" and as previously mentioned, the "both" category was excluded from the moderator analysis.

Analysis of Data

To analyze the data, this study utilized version 3.3 of the Comprehensive Meta-Analysis (CMA) program (Biostat, 2005), which follows the meta-analytic procedures described by Borenstein, Hedges, Higgins and Rothstein (2011). In CMA, the main analysis was conducted by examining the correlation coefficient (r) from each study. For one study (see Mat & Jantan, 2009), however, only a standardized beta was available to empirically describe the relationship between team trust and team performance. As noted by Peterson and Brown (2005), the use of beta coefficients in meta-analysis will produce relatively accurate effect size estimates of the relationship

between two variables. Therefore, this study was retained in the analysis utilizing the beta coefficient provided.

For each analysis in CMA, a 95% confidence interval was selected. In addition, each analysis was performed using a random- rather than fixed-effects model. According to Kisamore and Brannick (2008), a random-effects model represents the best choice when conducting a meta-analysis because such models make less restrictive assumptions. In a random-effects analysis, the assumption is that samples are drawn from populations with various effect sizes, and the "true" effect size varies from sample to sample. In contrast, fixed-effects models assume there is only one "true" effect size resulting in overly narrow confidence intervals when this assumption is incorrect (Kisamore & Brannick, 2008). Next, overall effect sizes were automatically calculated by the CMA program for the relationship between team trust and team performance, and for each of the moderator variables. In this process, when studies reported multiple trust measures (e.g., affective-based trust and cognitive-based trust), this study utilized CMA to average together the effect sizes to maintain statistical independence.

In addition, this study corrected for the unreliability of team trust and team performance measures, based on methods described by Schmidt and Hunter (2015). This calculation required that studies report a reliability statistic—more specifically, a Cronbach's alpha. Not all studies, however, reported alpha coefficients. Therefore, consistent with procedures utilized in previous meta-analyses that also focused on teams (e.g., Castaño et al., 2013; Hülsheger, Anderson & Salgado, 2009), the non-weighted average of all available alphas for each team trust and team performance measure was utilized in place of missing values (i.e., $\bar{r}_{xx} = 0.86$ for team trust; $\bar{r}_{yy} = 0.85$ for team

performance). For objective measures of team performance, however, perfect reliability was assumed if an alpha was not reported. Appendix C lists the reliabilities for the primary studies included in this meta-analysis. To interpret the magnitude of effect sizes, this study adopted Cohen's (1988) suggestions—"small" ($\bar{r}$ is less than or equal to 0.10); "moderate" ($\bar{r}$ is about 0.25); and "large" ($\bar{r}$ is greater than or equal to 0.40).

This current study further utilized CMA to evaluate between-study heterogeneity through analysis of the *Q*-statistic. A significant *Q*-statistic indicates that the studies included in the analysis varied substantially and thus, assessment for potential moderator variables is suggested to identify possible sources of the heterogeneity. Following this analysis, potential moderators were divided into three categories: team design, study design and measurement of key variables. To test the influence of each of the moderator variables, this study examined the *Q*-between statistic. A significant *Q*-between statistic is indicative of a significant moderator effect. Also, this study examined whether the correlations of the two levels of each moderator differed with regard to the current study's predicted magnitude.

Lastly, because meta-analysis relies on the results of available studies, the included studies may constitute only a subset of all studies that may be conducted on a topic. Rosenthal (1979) suggested that a "file drawer" issue exists in which study findings involving non-significant and negative results are less likely to be published than other findings, which can give misleading results in a meta-analysis. Therefore, to test whether the results may have been influenced by publication bias, this study used a *funnel plot*, in which the effect size of each study was plotted against its corresponding precision (measured in standard error). An asymmetrical pattern is indicative of a high

probability of publication bias. In addition, publication bias was assessed using Rosenthal's *fail-safe N test*, which indicates the number of studies with non-significant results that would be needed to change the overall effect size from significant to non-significant. The basic idea is that the higher the number of studies that would have to be included to change the overall effect to be non-significant, the greater the confidence that the results based on the primary studies are a good representation of all research (published and unpublished) on a topic.

Chapter 4: Results

Summary of Studies

Of the 204 studies initially identified for consideration, 120 studies were excluded (see Table 3). Thirty-seven of the excluded studies were included in previous or forthcoming meta-analyses on the topic (Breuer et al., 2016; de Jong et al., 2016; Maguin, 2010), but either did not meet this study's inclusion criteria (e.g., was a laboratory study), or were unpublished and could not be located due to non-response from study author(s). This resulted in the inclusion of a final sample size of 84 studies (5,529 teams) that examined the relationship between team trust and team performance. These studies are denoted with an asterisk in the References section.

Table 3. Reasons and rates for excluded studies

Reason for exclusion	No. of studies	Percent
Study design		
Insufficient statistical information	5	4.2%
Experiment	15	12.5%
Team design		
Team-like structures	5	4.2%
Teams not educational/organizational	4	3.3%
Variables of interest		
Individual/organizational level data only	27	22.5%
Referent not trust in team (e.g., trust in the leader)	8	6.7%
Trust/team performance not examined	45	37.5%
Miscellaneous		
Article retracted after publication	1	0.8%
Repeat study	4	3.3%
Unpublished and unable to retrieve	4	3.3%
In non-English language	2	1.7%
Total	**120**	**100%**

Appendix C provides a detailed summary of the 84 studies with empirical data on the relationship between team trust and team performance. From these 84 studies, there were only seven studies (8.3%) that reported negative mean effect sizes, including studies by Bresnahan (2008) (r = -0.03); Chung and Jackson (2013) (r = -0.17); Cohen, Ledford and Spreitzer (1996) (r = -0.12); Langfred (2004) (r = -0.10); Lvina, study 1 (2011) (r = -0.14); Lvina, study 2 (2011) (r = -0.09); and Peterson and Behfar (2003) (r = -0.10). Interestingly, almost half of these were unpublished (i.e., dissertations; k = 3, 43%). Overall, most of the studies included in the present meta-analysis were journal articles (k = 61, 72.6%), followed by dissertations (k = 12, 14.3%), conference papers (k = 7, 8.3%), Master's theses (k = 2, 2.4%) and book chapters (k = 2, 2.4%).

Regarding team characteristics, the average team size ranged from two to 21 members, with an overall mean team size of six members, although 11 studies (13.1%) did not report this information. The mean tenure of the teams ranged widely from approximately one week to five years, while 29 studies (34.5%) did not report this information. Regarding mode of communication, most of the studies analyzed teams relying on face-to-face mode of communication (k = 64, 76.2%), with the remaining studies analyzing teams relying on virtual mode of communication. With respect to task complexity, most of the studies assessed teams performing tasks high in complexity (k = 31, 36.9%), while only five studies (5.9%) assessed teams performing tasks low in complexity. Thirteen studies (15.5%) assessed teams performing medium complexity tasks, and 35 studies (41.7%) assessed teams performing a mixture of task complexity.

Regarding study design, the majority of the studies examined teams within organizational settings (k = 52, 61.9%), with the remaining studies examining teams in

educational settings. In regard to study age, Figure 3 presents the publication years of the studies included in the current meta-analysis. As Figure 3 shows, most of the studies were published since 2007 (k = 67, 79.8%). There were no studies published prior to 1996 that met the current study's inclusion criteria. Additionally, this study assessed the cultural context of the sample and found that most of the studies (k = 61, 72.6%) assessed teams located in individualistic cultures, whereas 13 studies (15.5%) assessed teams located in collectivistic cultures. Ten studies (11.9%) assessed teams located in a combination of individualistic and collectivistic cultures.

Lastly, with regard to measurement of key variables, most of the studies assessed team performance using subjective measures (k = 72, 85.7%), whereas 11 studies (13.1%) used objective measures. One study (1.2%) assessed team performance using an instrument that combined both subjective and objective measures. Furthermore, the majority of the studies operationalized team trust by aggregating individual responses to form a team-level response (k = 77, 91.7%), whereas six studies (7.1%) derived a team-level perception of team trust through use of a key informant. One study (1.2%) assessed team trust through a group forum method (see Akgün et al., 2005); in other words, a single response to a team trust survey was provided per team by means of a team discussion. The effect size for this study fell within the range of effects for the key informant group. Therefore, these two levels of the operationalization of team trust were eventually collapsed into one level, under the heading "key informant" for the moderator analysis.

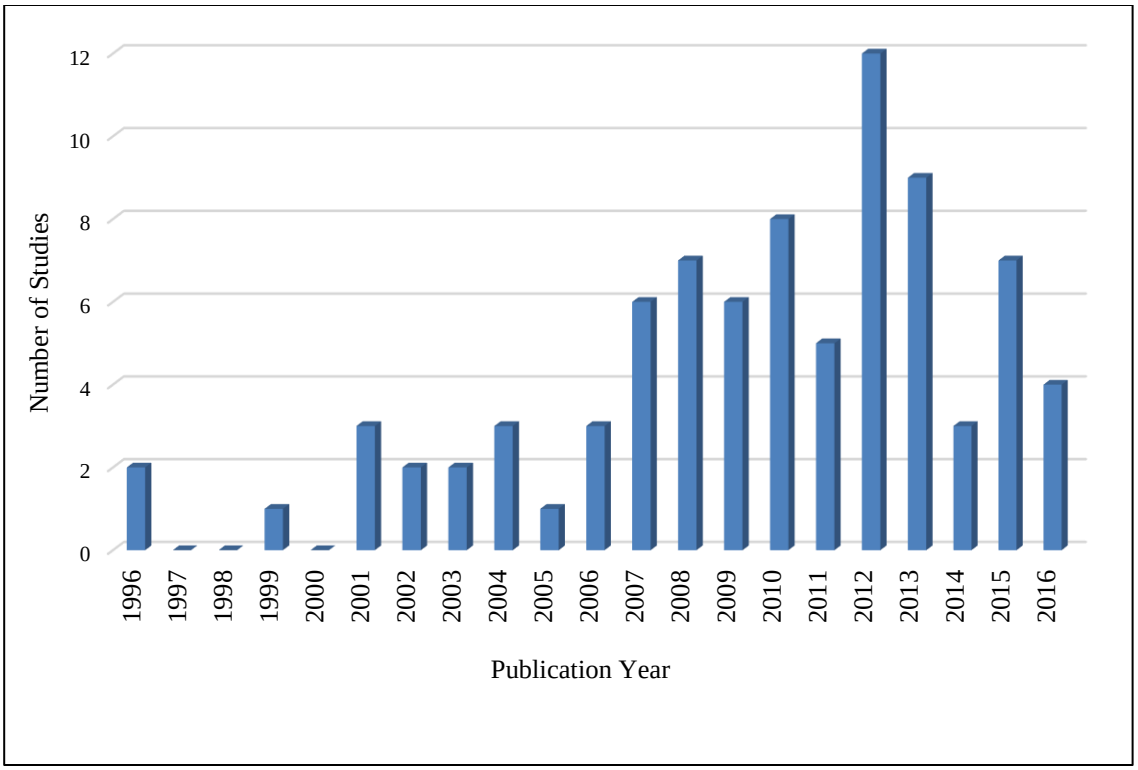


Figure 3. Publication year of included studies

Overall Analysis: Effect Size and Heterogeneity Test

After running the analysis with the CMA software for the 84 independent effect sizes, the overall effect size for the relationship between team trust and team performance was $\bar{r}$ = 0.34 (95% CI [0.28, 0.39], k = 84, 5,529 teams), indicating a positive and moderate effect size (see Table 4). After correcting for measurement unreliability, the effect size for the relationship increased to a positive and strong effect size ($\bar{r}_{\text{corrected}}$ = 0.40). Overall, the 95% confidence interval's exclusion of zero indicates that the effect size for the relationship was statistically significant. Therefore, these findings support Hypothesis 1.

Furthermore, this study examined between-study heterogeneity by analyzing the *Q*-statistic. Overall, the *Q*-statistic revealed significant heterogeneity among the 84 studies included in this meta-analysis ($Q = 385.30$, $p < 0.05$) (see Table 4). This result suggested that an analyses of moderator variables should be conducted to account for the heterogeneity in effect sizes. Therefore, moderator analyses were computed for the relationship between team trust and team performance.

Table 4. Results of overall relationship analysis

	k	*N*	$\bar{r}$	ρ	95% CI	*Q*-statistic
Random-effects model	84	5,529	0.335	0.40	0.28 – 0.39	385.30*

Note. *k* = number of studies; *N* = number of teams; $\bar{r}$ = mean correlation; ρ = corrected mean correlation for measurement error; CI = confidence interval.
*$p < 0.05$

Moderator Analysis

Team Design

Table 5 presents the results for four of the nine moderators that refer to the design of a team including: team size, team tenure, mode of communication and task complexity. Regarding team size, the difference between large teams (i.e., 10 or more members) and small teams (i.e., two to four members) was statistically significant (Q-between = 5.43, $p < 0.05$). Therefore, team size had a statistically significant moderating influence on the team trust-team performance relationship. In addition, as expected, the relationship was significantly stronger for large teams ($\bar{r}$ = 0.45, 95% CI [0.31, 0.57], k = 10) as opposed to small teams ($\bar{r}$ = 0.26, 95% CI [0.17, 0.34], k = 26). Therefore, Hypothesis 2 was fully supported.

For the team tenure moderator, the difference between ad hoc teams (i.e., members who had been together as a team less than one year) compared to intact teams (i.e., members who had been together as a team greater than or equal to one year) was also statistically significant (Q-between = 8.13, $p < 0.05$). Therefore, team tenure had a statistically significant moderating influence on the relationship between team trust and team performance. Furthermore, as predicted, the relationship was significantly stronger for intact teams ($\bar{r}$ = 0.39, 95% CI [0.30, 0.47], k = 26) as compared to ad hoc teams ($\bar{r}$ = 0.21, 95% CI [0.13, 0.29], k = 31). Therefore, Hypothesis 3 was fully supported.

Table 5. Summary of team design moderator analysis

Moderator	*N*	$\bar{r}$	95% CI	*Q*-between
Team size				
Large	10	0.45	0.31 – 0.57	13.53
Small	26	0.26	0.17 – 0.34	85.08
Test for level difference	36			5.43*
Team tenure				
Ad hoc	31	0.21	0.13 – 0.29	85.73
Intact	26	0.39	0.30 – 0.47	113.54
Test for level difference	57			8.13*
Mode of communication				
Face-to-face	64	0.32	0.26 – 0.38	306.06
Virtual	20	0.37	0.26 – 0.48	72.07
Test for level difference	84			0.63
Task complexity				
High	31	0.23	0.14 – 0.31	124.96
Low	5	0.30	0.03 – 0.52	1.25
Test for level difference	36			0.26

Note. N = number of teams; $\bar{r}$ = mean correlation; CI = confidence interval.
*$p < 0.05$

On the other hand, Hypotheses 4 and 5 were not supported. For the mode of communication moderator, the difference between face-to-face and virtual subgroups was not statistically significant (Q-between = 0.63, $p > 0.05$). Similarly, for the task complexity moderator, no statistically significant difference was observed between high and low task complexity subgroups (Q-between = 0.26, $p > 0.05$).

Study Design

Table 6 presents the results for three of the nine moderators that refer to the design of a study including: study team setting, study age and cultural context of the sample. Regarding study team setting, the difference between the two levels, educational and organizational team settings, was statistically significant (Q-between = 12.91, $p < 0.05$). Furthermore, as predicted, the relationship was significantly stronger for organizational settings ($\bar{r}$ = 0.40, 95% CI [0.34, 0.46], k = 52) as opposed to educational settings ($\bar{r}$ = 0.21, 95% CI [0.13, 0.30], k = 32). Therefore, Hypothesis 6 was fully supported.

Regarding study age, the results indicated that the difference between studies published in recent years (i.e., 2011 to 2016) compared to early years (i.e., 1996 to 2005) was statistically significant (Q-between = 5.88, $p < 0.05$). Therefore, study age was a statistically significant moderator of the team trust-team performance relationship. Furthermore, the analysis revealed that the relationship was significantly stronger for recent studies ($\bar{r}$ = 0.36, 95% CI [0.28, 0.44], k = 39) as opposed to early studies ($\bar{r}$ = 0.17 (95% CI [0.02, 0.30], k = 14). Therefore, Hypothesis 7 was fully supported.

The final study design moderator tested was the cultural context of the sample. Contrary to expectations, the difference between collectivistic and individualistic subgroups was not statistically significant (Q-between = 2.12, $p > 0.05$). Therefore, Hypothesis 8 was not supported.

Table 6. Summary of study design moderator analysis

Moderator	N	$\bar{r}$	95% CI	Q-between
Study team setting				
Educational	32	0.21	0.13 – 0.30	88.28
Organizational	52	0.40	0.34 – 0.46	239.32
Test for level difference	84			12.91*
Study age				
Early	14	0.17	0.02 – 0.30	34.64
Recent	39	0.36	0.28 – 0.44	207.94
Test for level difference	53			5.88*
Cultural context of the sample				
Collectivistic	13	0.42	0.29 – 0.54	65.93
Individualistic	61	0.31	0.25 – 0.38	280.79
Test for level difference	74			2.12

Note. N = number of teams; $\bar{r}$ = mean correlation; CI = confidence interval.
*$p < 0.05$

Measurement of Key Variables

Table 7 presents the results for two of the nine moderators that refer to the measurement of the key variables including: type of team performance measure and operationalization of team trust. For type of team performance measure, the difference between studies that used objective as opposed to subjective measures was statistically significant (Q-between = 4.78, $p < 0.05$). Furthermore, as expected, the relationship between team trust and team performance was significantly stronger for subjective

measures ($\bar{r}$ = 0.35, 95% CI [0.30, 0.41], k = 72) than objective measures ($\bar{r}$ = 0.17, 95% CI [0.00, 0.33], k = 11). Therefore, Hypothesis 9 was fully supported.

Finally, the analysis of operationalization of team trust found no statistically significant moderating effect. Specifically, there was insufficient evidence to find a statistically significant difference between studies that measured team trust using aggregation as opposed to a key informant approach (Q-between = 0.25, $p > 0.05$). Therefore, Hypothesis 10 was not supported.

Table 7. Summary of measurement of key variables moderator analysis

Moderator	*N*	$\bar{r}$	95% CI	*Q*-between
Type of team performance measure				
Objective	11	0.17	0.0 – 0.33	14.60
Subjective	72	0.35	0.30 – 0.41	352.44
Test for level difference	83			4.78*
Operationalization of team trust				
Aggregation	77	0.33	0.27 – 0.39	361.16
Key informant	7	0.38	0.20 – 0.53	20.36
Test for level difference	84			0.25

Note. N = number of teams; $\bar{r}$ = mean correlation; CI = confidence interval.
*$p < 0.05$

Publication Bias

A visual inspection of the funnel plot indicated a relatively symmetrical shape of observed primary effects (see Figure 4). There is some excess variability, with several studies falling outside of the funnel; however, most of the studies are inside the funnel plus or minus two standard deviations (i.e., no outliers). Therefore, the results of the funnel plot suggested that publication bias was unlikely in this study's analysis of the 84 studies examining the team trust-team performance relationship.

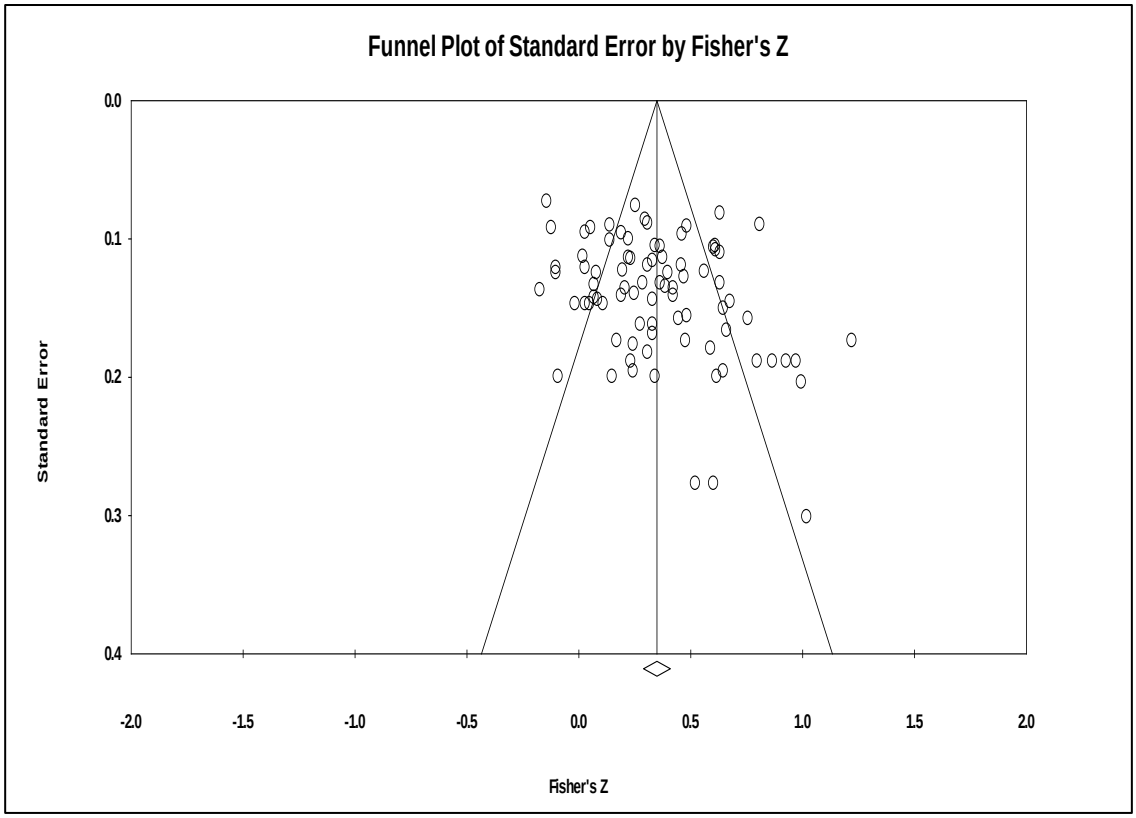


Figure 4. Funnel plot for publication bias

In addition, analysis of Rosenthal's fail-safe N test revealed that this study has an acceptable *z*-value for the included studies of 23.61. It is highly statistically significant with $p < 0.001$ using a two-tailed test with $\alpha = 0.05$ as the criterion for significance. Thus, it would take an extraordinary number of studies, 2,104 studies to be exact, with effect sizes of zero in order to lower the effect size of the current study to a *z*-value that is no longer statistically significant. Therefore, the fail-safe N test indicated that the mean effect size of this study ($\bar{r} = 0.34$) is sufficiently robust to conclude the file-drawer problem is unlikely for this meta-analysis.

Chapter 5: Discussion

Key Findings

One of objectives of this meta-analysis was to assess the overall relationship between team trust and team performance to determine its direction and strength. In addition, this study extends a forthcoming meta-analysis on the relationship that is also focused only on the team level. Notably, the findings of this study extend the results reported by de Jong et al. (2016). Although differences in inclusion criteria and coding procedures make comparison difficult, this present analysis was more narrowly focused than de Jong et al.'s (2016) meta-analysis (e.g., by limiting the criterion variable to only team performance and excluding other outcomes). In addition, this study examined the main relationship in association with a wider range of moderator variables, six of which have never been assessed in any published or pre-published meta-analysis on the topic (Breuer et al., 2016; de Jong et al., 2016; Maguin, 2010). Finally, this study contributed 17 new studies on the relationship between team trust and team performance. To the author's knowledge, this is the first meta-analysis to evaluate studies of the team trust-team performance relationship utilizing only real educational and organizational teams. An advantage of this design is that the generalizability of the results will apply to an organizational setting, which can provide helpful information for organizational managers.

Overall, the results of this meta-analysis revealed a significant positive association between team trust and team performance. These findings lend support to the assertion that trust is important in teams. In addition, after correcting for measurement error, the results indicate that the overall effect size between team trust

and team performance was large ($\bar{r}_{\text{corrected}} = 0.40$). Similarly, de Jong et al. (2016) also found a significant and positive relationship between team trust and team performance. In contrast, however, the magnitude of the relationship reported by de Jong et al. (2016) was weaker and only moderate (i.e., $\bar{r}_{\text{corrected}} = 0.30$). Publication bias is always a potential concern in meta-analysis; however, visual inspection of the funnel plot and the fail-safe N test suggested that publication bias was unlikely to significantly change the meta-analysis results.

Furthermore, this study found significant between-study heterogeneity, which is consistent with the results of all other meta-analyses on the topic. This current study expected that nine variables would significantly moderate the team trust-team performance relationship. In examination of these moderators, this study found that two team design moderators (i.e., team size and team tenure), two study design moderators (i.e., study team setting and study age) and one measurement moderator (i.e., type of team performance measure) explained a significant amount of variance in study effect sizes. The findings regarding type of team performance measure are similar to findings by all other meta-analyses on the topic. Interestingly, the results for the moderating effect of team tenure on the relationship between team trust and team performance are in contrast to the finding by de Jong et al. (2016). While this study found that team tenure significantly moderated the team trust-team performance relationship, de Jong et al. (2016) found the opposite. As previously mentioned, this may be due to the fact that the current meta-analysis only coded this variable regarding past time together as a team and therefore, excluded anticipated further time together as a team which was included by de Jong et al. (2016). The current study also found that mode of communication did

not have a significant moderating effect, which is consistent with the study by de Jong et al. (2016), but contrary to the meta-analyses by Breuer et al. (2016) and Maguin (2010). Therefore, the moderating effect of mode of communication on the overall relationship between team trust and team performance is still inconclusive.

As predicted, this study also found that team size moderated the relationship. In addition, the relationship between team trust and team performance was stronger with large as opposed to small teams. This finding supports available explanations for the effects of team size on interpersonal processes, which suggest stronger trusting relationships for larger teams (for example, because members may work harder to develop quality relationships to overcome the added coordination losses within their team).

Furthermore, one particularly interesting finding concerned the study age moderator. This moderator was proposed as more of an exploratory moderator in this study. As the issue of trust has gained increasing attention in society, it was expected that trust has become more important in teams and therefore, these opinions are manifest in people's responses to surveys of trust. As expected, this study found that study age did significantly moderate the relationship, in which the correlation between team trust and team performance was significantly stronger for studies published in recent as opposed to early years. This suggests there may be an overall shift in societal perceptions regarding the importance of trust in work relationships after highly publicized breaches of trust (e.g., Enron).

Lastly, in contrast to meta-analyses on the topic, this study conducted a separate analysis for differences in team setting (i.e., educational versus organizational). This

study found that team setting significantly moderated the relationship, such that the relationship between team trust and team performance was significantly stronger for organizational than educational teams. This was expected because teams in organizations may invest more energy in maintaining close and supportive ties in part, for example, because they are paid for their efforts and have more to lose than do members of educational teams. In addition, tasks required of organizational teams may require more effort and interdependency, which are helpful to the development of trust.

Contrary to expectations, however, this study did not find a significant difference between high and low levels of task complexity and therefore, task complexity did not significantly moderate the relationship between team trust and team performance. Yet, as mentioned previously, due to the inadequate reporting of task complexity by the primary studies, this study assigned task complexity as "high" or "low" based on team type. This practice, however, fails to acknowledge that team types themselves may differ with respect to task complexity. Therefore, this study essentially had to make several assumptions when coding for task complexity, which likely has resulted in the codings not very accurately representing the actual task complexity of the teams assessed by the primary studies.

In addition, the operationalization of team trust moderator (i.e., the manner in which team trust was measured by a study, either through aggregation or key informant) was not found to significantly moderate the team trust-team performance relationship. As of yet, relatively few studies on this topic measure team trust through a key informant method. As more studies accumulate, it may be possible to conduct a more comprehensive comparison of the manner in which trust is operationalized. Ideally, it

would be helpful to have sufficient data from all three categories: aggregation, key informant and group-forum methods.

Finally, this study examined whether the team trust-team performance relationship would significantly vary as a function of the cultural context of the sample. Recall that the cultural context of the sample included two levels, collectivistic and individualistic cultures, in which coding was based on the location of the teams that were assessed within a study. Contrary to expectations, however, since differences between collectivistic and individualistic subgroups did not reach statistical significance, this moderation hypothesis was not supported. In general, this suggests that the relative priority given to teamwork and a team's goals (by a team in whole) does not tend to significantly influence the direction or strength of the relationship between team trust and team performance.

Limitations

Before addressing the recommendations for future research, it is important to acknowledge that this present meta-analysis is not without limitations. First, some of the moderator analyses were based on only a small number of effect sizes for certain subgroups, namely for low task complexity ($k = 5$) and operationalization of team trust through key informant ($k = 7$). The concern is that small sample sizes generally produce low statistical power, which may have led to non-statistically significant findings in the moderator analysis of task complexity and operationalization of team trust.

A second limitation is that, although the current study found that publication bias was unlikely, there is still a possibility that some relevant studies were left out. Even though the current study was able to obtain several unpublished conference papers

and theses related to the topic, the estimated effect size found in this study may be slightly overestimated. For instance, this study was unable to retrieve some unpublished conference papers on the topic (due to a non-response from study authors); however, as mentioned previously, literature suggests that unpublished studies may be more likely to find negative associations between variables of interest.

Third, only studies in the English language were included in the current meta-analysis. Additional studies conducted in collectivistic cultures may be available in languages other than English, however, which could have resulted in somewhat different findings regarding Hypothesis 8 (i.e., the cultural context of the sample moderator). The assumption is that if the sample size was more robust for the collectivistic level, a significant as opposed to a non-significant difference between the collectivistic and individualistic levels would result.

Finally, there are coding limitations as well. Because the current meta-analysis only analyzed the two extreme levels of categorical moderators (e.g., high or low task complexity, small or large teams), the coding process was weakened. The problem is that information is lost when some categories are eliminated. Also, this study artificially dichotomized virtuality (or mode of communication), given that most studies did not report continuous data for this variable. Dichotomous coding, however, reflects some variation of an "all or none" method, which can make it difficult to detect meaningful relationships.

Future Directions

In the aforementioned discussion, this study illuminated several issues that require further research, such as the need for more studies to provide more detailed

study descriptions regarding factors related to team design (e.g., team tenure, team size, team task complexity). Moreover, moderators are clearly important for understanding the relationship between team trust and team performance and therefore, it is important for individual studies to continue to assess potential moderators of the relationship. For example, there are additional dimensions within Hofstede's (2001) work (e.g., power distance, uncertainty avoidance) that may explain variation in the relationship that might warrant more attention. Furthermore, the present study suggests some additional directions for future research.

In particular, research regarding trust in teams suggests that perceptions of trust can differ depending on the diversity of a team's members. For example, studies have often suggested that team member skill level and education may explain the results but are often examined only as control variables. Another issue for future consideration is the overall relationship between team trust and team performance in a variety of different team types. As previously mentioned, this dissertation focused solely on real educational and organizational team types; however, much of the literature on military/combat teams and sports teams discusses the importance of trust in a team. Nevertheless, few studies could be located that empirically assessed the team trust-team performance relationship in these team types. Research that assesses more non-traditional team types may provide a more complete picture of the relationship.

Finally, future research should consider the assessment of virtuality in teams. This study focused on team mode of communication (face-to-face versus virtual) as a potential moderator of the team trust-team performance relationship. Gilson, Maynard, Young, Vartiainen and Hakonen (2015) discussed that, given new and emerging

technologies, teams are likely to become increasingly virtual in nature (i.e., relying more on electronic means of communicating and interacting). Therefore, more research is needed to assess virtuality as a potential moderator of the team trust-team performance relationship. Along with this, it might be beneficial if future team trust researchers assess virtuality more as a continuous than a dichotomous variable.

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Appendix A: Coding Form Excerpt

The coding process for meta-analysis involves the use of a coding form that coders complete to record the data extracted from each study. The coding form below is an excerpt from the coding form that was developed for this study as a spreadsheet in Excel. As can be seen below, the coding form contains two major sections: moderator information and statistical information.

		Moderator information:									**Statistical information:**				
Study name		Team location	Team setting	Team type	Mean team size	Mean team tenure		Mode of communication	Performance measure	Trust variable	Performance variable	Reliability		*N*	Effect size	
First author last name	Pub. year					Value	Unit					Rxx	Ryy		P/N	Value
Akgün	2007									Trust	Success					
Akgün	2012									Trust	Success					
Akgün	2014									Trust	Effectiveness					
Boies	2010									Trust	Performance					
Brahm	2012									Trust	Performance					
Chou	2013									Cognitive Trust	Performance					

Appendix B: Coding Manual

Moderator information:

What is the location(s) of the teams utilized in the study [Team location]?

> List the country of the teams. Some teams will be located in two or more different countries. List each country separately. Use the best information available. For instance, if a study did not report a specific location, but reported that the teams were "global," "multinational" or spread across "four continents," code as such. For virtual team studies, if the locations of the individual virtual teams were not reported, code the country of the parent organization. If no team location is specified, code the author(s)' school location.

What is the team setting [Team setting]?

> E = Educational. These are individuals enrolled in academic courses, performing tasks as part of a class assignment;
>
> O = Organizational. These are members of real organizations, performing tasks as part of the needs of a particular job;

What are the types of teams described in the study [Team type]?

> A = Action (production) teams. These are assemblers (e.g., block-builders in an experiment), manufacturing teams (e.g., equipment operators) and others that are highly skilled teams performing physical or overt task execution;
>
> D = Decision-making teams. These are quality control teams, problem-solving teams, top management teams, strategy formulation teams, teams utilizing simulation games that focus on decision-making (e.g., *The Business Strategy Game®, Democracy 2®, Global Corporate Management in the Marketplace®, The Tinsel Town Simulation®*) and others that involve developing ideas and reaching a consensus on issues;
>
> P = Project teams. These are academic/student teams (e.g., writing, brainstorming, researching), coordination/customer service teams, sales teams, clerks/administrative teams, engineering teams, computer programming teams and others who often collaborate on assigned or original projects;
>
> M = Mixed teams. These are "cross-functional," "multi-functional" and others that perform a combination of the tasks described above. Also, researchers have often described software/product development teams as cross-functional because they generally involve people with different views, functional backgrounds and knowledge.

Note. If only an entire industry (e.g., teams from the information technology industry) or organizational type (e.g., teams from social care institutions) is reported, assume "M" for mixed.

What is the average size of the teams [Mean team size]?

Fill in the average size of the teams that were sampled in the study. If only the range is reported, then use the middle number of the range. For example, if it is reported teams ranged in size from 2 to 5 members, the range would be 3.5. Do NOT count average *respondents per team* (number of people who responded to the surveys) as average team size.

What is the average tenure members have been with their teams [Mean team tenure]?

In the "Value" column, fill in the average length of time the individuals utilized in the study have been with their teams (NOT organizational/firm tenure). In the "Unit" column, code whether the value is expressed in minutes, hours, weeks, months, years, semesters/terms. If team tenure is not reported, but it is clear the teams were formed specifically for the purpose of a college course, then code the estimated course length (e.g., 1 semester).

What is the primary mode of communication within the teams [Mode of communication]?

F = Face-to-face communication. Assume that teams communicated primarily face-to-face, unless a study specifically made reference to using virtual, distributed or global teams;

V = Virtual communication. These teams refer to members who are geographically dispersed and must primarily/completely rely on electronic communication (e.g., e-mail, texting, video sharing).

What is the type of team performance measure utilized [Performance measure]?

S = Subjective measures. These are assessments of team performance based on an individual's perception or interpretation. They include surveys filled out by individuals internal or external (e.g., grades given by teachers) to the team;

O = Objective measures. These are assessments of a team's performance based on factual data, such as financial data, game points (including simulation game scores), number of ideas generated in a brainstorming task, etc.;

B = Both. Studies that combined both subjective and objective measures into a single effect size, rather than reporting a separate effect size for each measure.

Statistical Information:

What are the reliability coefficients [Reliability]?

> In the "r_{xx}" column, code the Chronbach's alpha (α) value of reliability for the trust scale; and "r_{yy}," the alpha for the performance scale.

What is the number of teams sampled in the study [*N*]?

> This dissertation is conducted at the team level. Therefore, code number of teams (NOT individuals) utilized in a study.

What is the effect size for the trust and performance relationship [Effect size]?

> In the "P/N" column, code whether the effect size value is "P" for positive or "N" for negative. In the "Value" column, code the correlation plus two decimal places.

Appendix C: Detailed Summary of Included Studies

Study Name	Team location	Team setting	Team type	Mean team size	Mean team tenure	Mode of communication	Performance measure	Trust measure	Reliability		*N*	Effect size
									r_{xx}	r_{yy}		
Akgün (2005)	Turkey	O	M	NR	NR	Face-to-face	Subjective	Group forum	0.62, 0.71	0.87, 0.87	69	0.16, 0.23
Akgün (2007)	Turkey	O	M	9.69	NR	Face-to-face	Subjective	Aggregate	0.8	0.91	53	0.4
Akgün (2012)	Turkey	O	M	NR	NR	Face-to-face	Subjective	Key informant	NR	NR	92	0.35
Akgün (2014)	US	O	M	NR	NR	Face-to-face	Subjective	Key informant	NR	NR	129	0.3
Baruch (2012)	Taiwan	O	M	NR	NR	Virtual	Subjective	Aggregate	0.92	0.89	152	0.56
Bijlsma-Frankema (2008)	Netherlands	E	P	5	16 weeks	Face-to-face	Subjective	Aggregate	NR	NR	57	0.4
Blatt (2008)	US	O	M	3.98	NR	Face-to-face	Subjective	Key informant	0.95	0.63	123	0.45
Boies (2010)	Canada	E	D	3.96	12 weeks	Face-to-face	Objective	Aggregate	0.91	1.00	49	0.11
Brahm (2012)	Germany	O	P	3.36	3 months	Virtual	Subjective	Aggregate	0.87	0.97	50	0.59
Braun (2013)	Germany	O	P	9.2	NR	Face-to-face	Objective	Aggregate	0.8	1.00	28	0.15
Bresnahan (2008)	US	E	P	5.13	9 weeks	Face-to-face	Subjective	Aggregate	0.67, 0.71	NR, NR	49	-0.04, 0.01

Buvik (2016)	Norway	O	M	5.7	NR	Face-to-face	Subjective	Aggregate	0.76	0.9	31	0.75
Carmeli (2012)	Israel	O	D	5.12	NR	Face-to-face	Subjective	Aggregate	0.85	0.85	77	0.32
Chang (2012)	US	O	M	4.64	NR	Face-to-face	Subjective	Aggregate	0.79	0.81	91	0.54
Chen (2008)	Taiwan	E	P	12.5	6 weeks	Virtual	Subjective	Aggregate	0.91	NR	14	0.77
Chou (2013)	Taiwan	O	M	8.78	32.5 months	Face-to-face	Subjective	Aggregate	0.8	0.94	39	0.58
Chuang (2004)	Taiwan	O	M	9	20 months	Face-to-face	Subjective	Aggregate	0.92	0.94	64	0.44
Chung (2013)	US	O	P	NR	NR	Face-to-face	Objective	Aggregate	NR	1.00	56	-0.17
Cogliser (2012)	US	E	P	4.5	12 weeks	Virtual	Subjective	Aggregate	0.88	NR	71	0.03
Cohen (1996)	US	O	P	NR	4 years	Face-to-face	Subjective	Aggregate	0.82	0.97	120	-0.12
Connelly (2011)	US	E	P	3	6 weeks	Virtual	Subjective	Aggregate	0.96	NR	81	0.02
Costa (2001)	Netherlands	O	M	4.25	2.8 years	Face-to-face	Subjective	Aggregate	0.87	0.75	112	0.03
Costa (2009)	Netherlands	E	P	5.5	16 weeks	Face-to-face	Subjective	Aggregate	0.9	NR	79	0.23
Crisp (2013)	Global	E	P	4	8 weeks	Virtual	Both	Aggregate	NR	NR	68	0.51

Curşeu (2010) Study 1	Netherlands	E	P	5.18	7 weeks	Face-to-face	Subjective	Aggregate	0.75	NR	174	0.25
Dayan (2010)	Turkey	O	M	8.12	NR	Face-to-face	Subjective	Key informant	0.72, 0.85	0.81, 0.81	93	0.53, 0.56
De Jong (2010)	Netherlands	O	P	10.2	NR	Face-to-face	Subjective	Aggregate	0.91	0.87	73	0.3
De Jong (2012) Study 1	Netherlands	E	D	5.68	1 year	Face-to-face	Subjective	Aggregate	NR	NR	67	0.38
De Jong (2012) Study 2	Netherlands	O	A	12.1	4.1 years	Face-to-face	Subjective	Aggregate	NR	0.91	41	0.32
De Jong (2014)	Netherlands	O	A	12.8	4 years	Face-to-face	Subjective	Aggregate	0.93	0.85	41	0.27
Dekker (2008)	Global	O	M	20.95	1.9 years	Virtual	Subjective	Aggregate	0.78	0.92	47	0.57
Donati (2013)	Italy	O	D	5.3	26.8 months	Face-to-face	Subjective	Aggregate	0.92	0.93	28	0.55
Druskat (2006)	US	O	A	9.75	5 years	Face-to-face	Objective	Aggregate	0.73	1.00	16	0.48
Ferguson (2015)	UK	E	P	6.16	1 term	Face-to-face	Subjective	Aggregate	0.91	NR	125	0.14
Geister (2006)	Germany	E	D	2	6 weeks	Virtual	Subjective	Aggregate	0.93, 0.93	0.72, 0.55	52	-0.08, 0.22
Groesbeck (2001)	US	O	M	8.6	4.4 years	Face-to-face	Subjective	Aggregate	0.89	NR	100	0.14
Gupta (2011)	US	E	D	4.06	10 weeks	Face-to-face	Objective	Aggregate	0.95	1.00	36	0.17

Hakonen (2009)	Finland	O	M	9.52	25.9 months	Virtual	Subjective	Aggregate	0.94	0.73	31	0.70
Harvey (2010)	US	O	M	7.45	NR	Face-to-face	Subjective	Aggregate	0.95	0.84	31	0.73
Hempel (2009)	China	O	M	5.49	38.79 months	Face-to-face	Subjective	Aggregate	0.74, 0.85	0.77, 0.77	102	0.19, 0.25
Hertel (2004)	Germany	O	P	7	14 months	Virtual	Subjective	Aggregate	0.89	0.82	31	0.23
Hu (2012)	US, China	O	M	4.75	2.77 years	Face-to-face	Subjective	Aggregate	0.93	0.74	60	0.35
Huang (2009)	Taiwan	O	M	NR	NR	Face-to-face	Subjective	Aggregate	0.87	0.82	60	0.56
Jehn (2001)	US	E	P	3	12 weeks	Face-to-face	Subjective	Aggregate	0.82	NR	51	0.32
Joshi (2009)	Global	O	P	4.15	2 years	Virtual	Subjective	Aggregate	0.68	0.72	28	0.33
Kanawattanachai (2002)	Global	E	D	4	8 weeks	Virtual	Objective	Aggregate	NR, NR	1.00, 1.00	36	0.34, 0.54
Kanawattanachai (2007)	Global	E	D	3.5	8 weeks	Virtual	Objective	Aggregate	0.93	1.00	38	0.32
Khan (2014)	Austria	O	M	2.09	NR	Face-to-face	Subjective	Aggregate	0.89	0.87	44	0.45
Khan (2015)	Austria	O	M	2.09	NR	Face-to-face	Subjective	Aggregate	0.92, 0.82	0.83, 0.83	88	0.50, 0.59
Langfred (2004)	US	E	A	4	4 months	Face-to-face	Subjective	Aggregate	0.83	NR	71	-0.10

Langfred (2007)	US	E	P	4	4 months	Face-to-face	Subjective	Aggregate	0.89	NR	33	0.30
Lee (2010)	Australia	O	P	8	3 years	Face-to-face	Subjective	Aggregate	0.88, 0.95	0.90, 0.90	34	0.40, 0.64
Lee (2015)	S. Korea	O	M	NR	NR	Face-to-face	Subjective	Aggregate	0.95	0.94	126	0.67
Lvina (2011) Study 1	Canada	E	P	4.5	8 weeks	Face-to-face	Subjective	Aggregate	0.78	NR	189	-0.14
Lvina (2011) Study 2	Russia	O	M	8	18.34 months	Face-to-face	Subjective	Aggregate	0.71	NR	28	-0.09
Lyubovnikova (2015)	UK, Greece	O	A	5.26	20.5 months	Face-to-face	Subjective	Aggregate	0.85	0.88	53	0.19
Mach (2015)	UK	E	P	4.9	10 weeks	Face-to-face	Subjective	Aggregate	0.91	NR	73	0.43
Mahony (2012)	US	E	D	3.5	3 weeks	Face-to-face	Subjective	Aggregate	0.94	NR	59	0.07
Martínez-Tur (2016)	Spain	O	M	8.02	NR	Face-to-face	Subjective	Aggregate	0.85	0.76	93	0.33
Mat (2009)	Malasia	O	M	NR	NR	Face-to-face	Subjective	Aggregate	0.97, 0.95	0.84, 0.84	120	0.05, 0.06
Meurs (2015)	Netherlands	O	M	7.13	NR	Face-to-face	Subjective	Aggregate	0.86	0.86	16	0.54
Muethel (2012)	Germany	O	M	5.94	17.5 months	Virtual	Subjective	Aggregate	0.82	0.82	80	0.36
Nauta (2002)	Netherlands	E	P	4	13 weeks	Face-to-face	Subjective	Aggregate	0.90	0.90	111	0.19

Olson (2007)	US	O	D	4.79	NR	Face-to-face	Subjective	Aggregate	0.92	0.92	85	0.56
Palanski (2011) Study 1	US	E	P	4	NR	Face-to-face	Subjective	Aggregate	NR	NR	35	0.24
Parayitam (2005)	US	O	D	4.68	NR	Virtual	Subjective	Aggregate	0.88, 0.92	0.85, 0.85	109	0.15, 0.65
Peterson (2003)	US, UK	E	P	4	7 weeks	Face-to-face	Subjective	Aggregate	0.89	NR	67	-0.10
Pinjani (2013)	Global	O	M	11.2	9.2 months	Virtual	Subjective	Aggregate	0.89	0.86	58	0.37
Pitts (2010)	US	E	M	3.5	5 days	Virtual	Objective	Aggregate	0.78, 0.79	1.00, 1.00	49	-0.08, 0.14
Politis (2003)	Australia	O	M	9	NR	Face-to-face	Objective	Aggregate	0.86, 0.76	0.82, 0.82	49	0.04, 0.06
Porter (1996)	US	E	P	5.5	4 weeks	Face-to-face	Subjective	Aggregate	0.93	NR	80	0.22
Potrafka (2016)	US	O	M	5	2.2 years	Face-to-face	Subjective	Aggregate	0.89, 0.91	0.89, 0.89	36	0.85, 0.83
Rispens (2007)	Netherlands	O	P	4.48	3.6 years	Face-to-face	Subjective	Aggregate	0.89	0.87	27	0.76
Robert (2012)	Global	E	P	3.94	61 days	Virtual	Subjective	Aggregate	NR, NR	NR, NR	51	0.18, -0.01
Robert (2016)	Global	E	P	3.77	60 days	Virtual	Subjective	Aggregate	NR, NR	NR, NR	57	0.15, 0.26
Small (2010)	US	E	D	4.67	16 weeks	Face-to-face	Objective	Aggregate	0.86	1.00	60	0.28

Spreitzer (1999)	US	O	D	10.5	~4 years	Face-to-face	Subjective	Aggregate	0.98	NR	43	0.42
Stewart (2006)	US	O	M	8.25	NR	Face-to-face	Objective	Key informant	NR, NR	1.00, 1.00	67	0.06, 0.10
Tuer (2013)	Canada	E	P	4.3	2 weeks	Face-to-face	Subjective	Aggregate	0.95	NR	29	0.24
Webber (2008a)	Canada	E	P	3.5	1 term	Face-to-face	Subjective	Aggregate	0.84, 0.88	NR, NR	54	0.22, 0.27
Webber (2008b)	Canada	O	M	4.5	NR	Face-to-face	Subjective	Aggregate	0.77, 0.75	0.92, 0.92	31	0.57, 0.74
Weimar (2013)	Netherlands	O	M	NR	NR	Face-to-face	Subjective	Aggregate	0.79	0.87	29	0.57
Welborne (2015)	US	E	P	NR	NR	Virtual	Subjective	Key informant	0.93	0.85	43	0.64
Wiedow (2013) Study 2	Germany	O	M	9.19	63.64 months	Face-to-face	Subjective	Aggregate	0.94	NR	137	0.29

Note. Team setting (E = educational; O = organizational); Team type (A = action; D = decision-making; P = project; M = mixed); NR = not reported