The Impact of Team Diversity on Team Outcomes: Meta-analytic Findings of Team Demography

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ABSTRACT

This study used a meta-analytic technique to synthesize the empirical results from 55 studies to examine the effects of job-related and bio-demographic diversity on two primary types of team outcomes: performance and social integration. Additionally, moderator variables were tested to investigate their potential influences on the relationships between team diversity and outcomes.

The results indicated that team diversity overall had a positive and significant influence on team performance, although no relationship was found between team diversity and social integration. Varying effects of team diversity on team performance were also revealed as job-related diversity had a stronger positive relationship with the quantity of team performance than bio-demographic diversity. Finally, partial support was found for the hypothesized moderators. Task complexity, for example, was found to moderate the relationship between job-related diversity and team performance. There was a stronger relationship for teams working on highly complex tasks than teams working on less complex tasks. Similarly, team type moderated the relationship between job-related diversity and team performance. There was a stronger relationship for work teams than management/project teams. However, team size and team setting did not moderate the relationships between team diversity and performance.

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CHAPTER 1

INTRODUCTION

Chapter Overview

This chapter provides a basic introduction to the topic of the impact of team diversity on team outcomes in organizations. Beginning with a general synopsis of the potential impact that effectively managing team diversity can have upon organizational solvency, it then highlights the problems that such research has had in reaching conclusions to date. Next, the study objectives are presented followed by the overarching research questions. The theoretical framework and the variables examined in the study are then discussed in detail. Finally, assumptions and limitations of the study as well as the definitions of the key terms are presented.

Introduction

With the demographic composition of the American workforce becoming increasingly diverse, U.S. corporations are trying to achieve new levels of competitive advantage through the strategic utilization of the variety of talents in their heterogeneous employee populations (Workforce 2000, 1987). In doing so, organizations are increasingly attempting to integrate the diverse backgrounds, knowledge, and expertise of employees within work team structures. As a result, using teams consisting of members with varying abilities and backgrounds is becoming a growing practice in modern organizations (Cox & Blake, 1991; Easely, 2001). Diversity in teams, however, poses both opportunities and threats. If managed properly, team heterogeneity can create a

significant operational synergy, while mismanaged team diversity can become a major impediment to optimal functioning due to intragroup conflict, miscommunication, and lack of trust (Jackson, 1992; Jackson, May, & Whitney, 1994; Watson, Kumar, & Michaelsen, 1993).

Although an increasing number of organizations are integrating workforce diversity as part of their business strategy and further capitalizing on such diversity, managing diversity is a relatively new field of endeavor and much about the phenomenon is still unknown (Pelled, Eisenhardt, & Xin, 1999; Weber & Donahue, 2001). Some researchers have taken the position that the melting-pot policy of diverse groups is a failure (Benne, 1990; Loden, & Rosener, 1991; Tung, 1997). While in theory, it may sound easy to simply place diverse individuals together into work teams and await superior performance, often in reality, many irreconcilable divisions among heterogeneous individuals lead to dysfunctional team interaction and thus poor performance and decreased morale.

Therefore, there are diverse opinions about the impact of heterogeneous teams on organizational performance. As a consequence, a major line of research has emerged attempting to understand how the dynamics of workforce diversity influences work team outcomes. Over the past two decades, a number of models and paradigms have been postulated in an attempt to assess the impact of member characteristics on team outcomes (Jehn, 1995; Pelled, Eisenhardt, & Xin, 1999; Pfeffer, 1983; Tziner, 1985). Yet, in spite of numerous research endeavors, the impact of team diversity on team outcomes as well as other intervening variables affecting the relationship is not clearly understood. Consequently, the literature yields mixed results (Levine & Moreland, 1999; Lawrence,

1997). A lack of consensus from conflicting findings has ultimately created a great deal of discord in the field (Gist, Loke, & Taylor, 1987; Gladsten, 1984; Guzzo & Shea, 1992; Hackman, 1987). This study attempted to clarify some of the contradictory findings regarding the impact of team diversity on team outcomes by employing meta-analysis.

Significance of the Study

This study investigated the impact of different dimensions of team diversity on the two categories of team outcomes, performance and social integration, by meta-analyzing the empirical data from the previous studies. In addition, this study is the first attempt to meta-analyze the impact of team diversity on organizational outcomes using Cox and Blake's classifications (1991). Findings from the current study thus extend the knowledge of strategic organizational practices by clarifying the effects of team diversity on team outcomes. Given the increasingly heterogeneous composition of the workforce and widespread use of team work, the findings from the current study offer significant value for the field of Human Resource Development (HRD) by establishing the groundwork for developing theory and interventions to improve the efficacy of organizational practices.

Objectives of the Study

In this study, data from various studies in the team literature were statistically synthesized in order to estimate the relationships between various elements of team diversity and the two types of team outcomes, team performance and social integration. The following three research objectives were investigated to examine the effects of team diversity on team outcomes:

1) Measure the overall relationships between team diversity and team outcomes.
2) Assess the varying impacts of the two types of team diversity on team outcomes.
3) Examine the effects of potential moderators on the relationships between team diversity and team outcomes in the presence of heterogeneous effect sizes.

Research Questions

This study addressed the following seven research questions. Additionally, when large differences were found among study effect sizes (heterogeneity of effect sizes), further tests were conducted in order to explain effect size variability by analyzing a-priori moderators identified in the literature. The four conceptually-based moderators were as follows: 1) team size, 2) task complexity, 3) team type, and 4) team setting.

1. What is the relationship between job-related diversity and team performance?
2. What is the relationship between bio-demographic diversity and team performance?
3. What is the relationship between job-related diversity and social integration?
4. What is the relationship between bio-demographic diversity and social integration?
5. Does job-related diversity have a greater impact on team performance than bio-demographic diversity?
6. Does bio-demographic diversity have a greater impact on social integration than job-related diversity?
7. Do any of the moderators explain the effect size heterogeneity?

Theoretical Framework and Study Variables

The basic premise of the current study is that team outcomes are affected by two broad categories of characteristics in team members: bio-demographic and job-related diversity. It is also proposed that moderators affecting the relationships between team diversity and outcomes exist when there is substantial heterogeneity in results. The current study is based upon a three part conceptual model of the relationships between team diversity and team outcomes (see Figure 1). The three parts are:

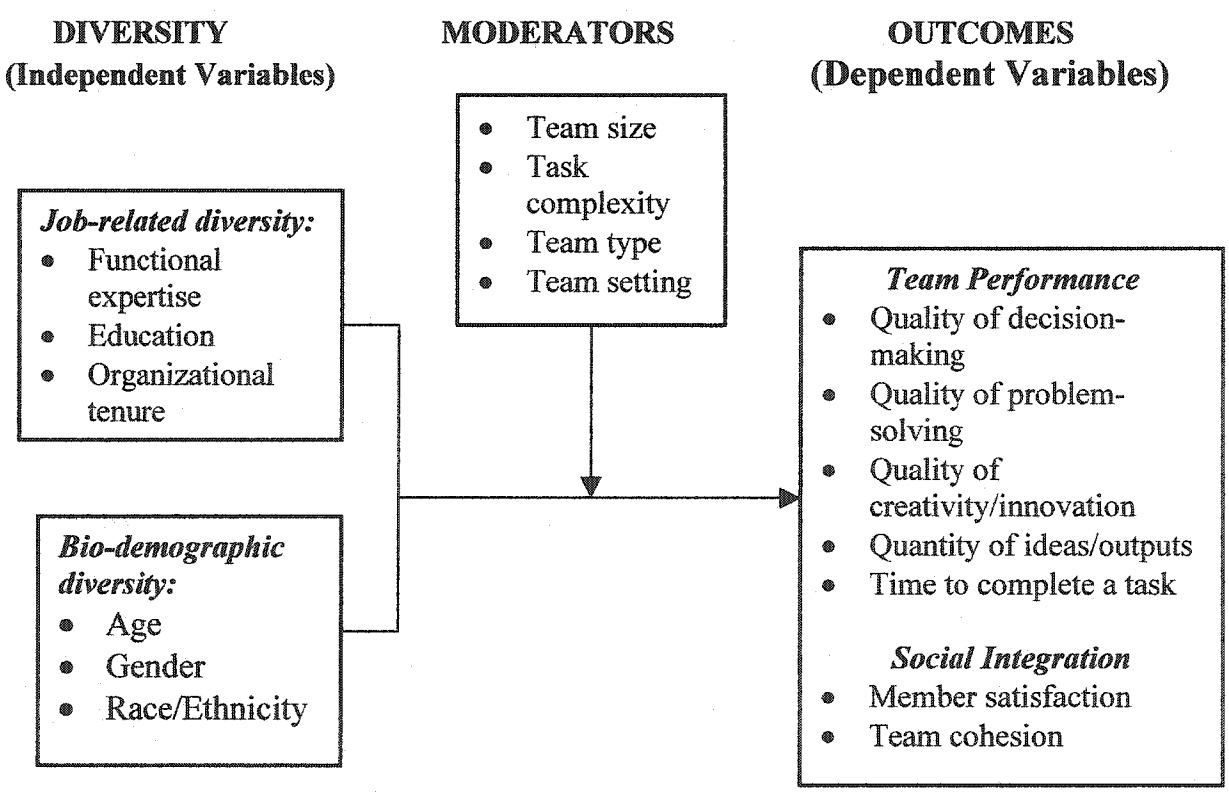
1) Team diversity categorized as job-related and bio-demographic diversity.
2) Team outcomes delineated as team performance and social integration.
3) Four conceptually-based moderators, which are team type, team size, team setting, and task complexity.

Team diversity is divided into two broad categories, job-related and bio-demographic characteristics. Team outcomes are operationally defined by two broad concepts, team performance and social integration. Team performance is measured by both quality and quantity that team members exhibit, and social integration is conceptualized as membership satisfaction and team cohesion.

With respect to the dichotomous classification of team diversity, bio-demographic characteristics refer to members' inherent qualities that are immediately detectable, such as age, gender, and race/ethnicity, while job-related characteristics are concerned with members' acquired attributes, such as functional expertise, education, and organizational tenure. Regarding the team outcome categories, first, the quality of performance is measured by the following three sub-categories: 1) quality of decision-making, 2) quality of problem-solving, and 3) quality of creativity/innovation. The three variables regarding

the quality of performance are largely adopted from Cox and Blake's diversity outcomes (1991), as they are intended to capture the competitive advantages of having diverse employees. Second, the quantity of performance is investigated by examining the number of ideas/outputs generated and time to complete a team task, as the two measures are frequently used in the traditional business literature. Third, social integration is operationalized by two measures, team member satisfaction and team cohesion (Goodman, Ravlin, & Schminke, 1987). Team member satisfaction reflects the degree to which members of a team like each other and enjoy their working relationships, while team cohesion refers to the extent to which team members attempt to remain intact in order to achieve team goals (Bettenhausen, 1991; Carron, 1982; Witteman, 1991).

Figure 1 The Conceptual Model of the Impact of Team Diversity on Team Outcomes



A final issue to be addressed in this meta-analysis study pertains to identifying potential moderators affecting the relationships between team diversity and team outcomes. Although moderators can encompass a number of variables that may influence the relationships, this study focuses on four moderators identified in the literature, task complexity, team size, team type, and team setting. The selection of the four moderators was guided by the existing literature as well as the suggestions provided in the previous meta-analyses (Bowers, Pharmer, & Salas, 2000; Cohen & Bailey, 1997; Weber & Donahue, 2000). Research posits that the four moderators are possible bases for explaining the presence of the heterogeneity of effect sizes between team diversity and team outcomes.

1) Task complexity: Research indicates that when a task is simple and well-defined, team members rely on standardized operating procedures to complete the task. Therefore, conflicts arising from member differences may be unnecessary and even counterproductive (Gladstein, 1984; Jehn, 1995). In contrast, debates and task conflicts can be constructive for team members to identify appropriate task strategies in a complex and ill-defined task (Amason & Schweiger, 1995; Fiol, 1994; Jehn, 1995). Reflecting this distinction, task complexity was investigated regarding its potential moderating impact on the relationship between team diversity and outcomes.
2) Team size: Studies have found that large teams suffer coordination and process losses (Gooding & Wagner, 1985; Mullen, Symons, Hu, & Salas, 1989). Although large teams can generate more outputs as additional members

add resources or skills to teams, additional members can also complicate the amount of possible simple interactions thereby decreasing satisfaction and trust among members (Gully, Devine, & Whitney, 1995; Magjuka & Baldwin, 1991). Team size was thus included as a potential moderator affecting the relation between team diversity and team outcomes.

3) Team type: A variety of teams are employed in organizations, and researchers have argued that the distinctions among different types of teams should be made and further considered in studying teamwork. The underlying logic of such argument is that team type may influence the magnitudes of the relationships between team diversity and performance (Cannon-Bower, Oser, & Flanagan, 1992 Cohen & Bailey, 1997). For instance, members of top management teams and project teams are more likely to be heterogeneous on highly job-related attributes, such as expertise and educational background, but more likely to be homogeneous on bio-demographic attributes, such as age, race, and gender. In contrast, work teams tend to be heterogeneous on bio-demographic characteristics while being homogeneous on functional expertise and education level.

4) Team setting: Team setting was examined as a potential moderator with the expectation that effects of team diversity on outcomes might be stronger in teams in real organizations where the stakes are higher as opposed to student samples in laboratory settings.

Assumptions

Two different statistical models, fixed and random effects, are used within the general meta-analytic approach and differ in their statistical assumptions in examining and interpreting the mean and variance of effect sizes (Hedges & Olkin 1985; Hunter & Schmidt, 1990). In the fixed-effects model, it is assumed that all of the studies in the meta-analysis estimate a common population effect, also known as "homogeneity of effect sizes". In contrast, the random-effects model of meta-analysis does not assume the homogeneity of effect sizes. Rather, it assumes that the studies in the meta-analysis are truly heterogeneous and thus treats the effect size from each study as drawn from a distribution of study effects. In this model, the study effects represent samples from a population (Rothstein, McDaniel, & Borenstein, 1992).

According to Hedges and Vevea (1996), in some cases, it is appropriate to use fixed-effects models when there is substantial heterogeneity in results as long as there is no theoretical reason to suspect that the studies are truly heterogeneous. Furthermore, differences in the results of meta-analysis based on fixed-effects and random-effects model arise only when the study results are statistically heterogeneous; otherwise, both models yield the identical results. The assumption of the fixed-effects model was made in this study while employing the Hedges and Olkin's approach of partitioning effect size variance. Specifically, this study assumed that if there was substantial heterogeneity in results, studies had systematic sources that could be explained by moderating variables captured in the coding process.

Limitations

There are several limitations to this study. First, it should be noted that this study did not attempt to reveal causality concerning the effects of team diversity on team outcomes. As in any study employing a correlational research design, causal inferences are not warranted in this meta-analysis. Second, although there are other moderators that may influence the relationships between team diversity and outcomes, only four a priori moderators were selected for this study. Third, the conceptual framework presented in this study is not an exhaustive portrayal of all variables and relationships regarding team diversity and team outcomes. Fourth, because of limitations within some of the studies used in this meta-analysis, the sensitivity of the analysis to detect smaller effects may be constrained. Finally, all studies were not included due to missing statistical information. Although effort was made to contact authors to obtain necessary information, in some cases, the information was neither available nor were authors able to be contacted.

Definitions of Key Terms

Diversity. The business and management literature defines diversity to include not only differences in visible demographic markers, such as gender and ethnicity, but also dissimilarities in job related attributes, such as expertise, education, and tenure (Bantel & Jackson, 1989; Guzzo & Dickison, 1996; Weisema & Bird, 1993). Reflecting the definition in the literature, diversity encompasses both demographic and job related characteristics in this study.

Team. There are multiple definitions of "team" in the current team literature (Campion, Medsker, & Higgs, 1993; Hackman & Oldham, 1980; Salas, Converse, &

Tannenbaum; 1992; Sundstrom, Demeuse, & Futrell, 1990). One commonality found among the definitions is the requirement for individuals to engage in cooperative and interdependent actions to achieve a collective goal. It is this requirement for interactions and mutual goal alignment that differentiates a "team" from just an informal group of individuals (Stout, Salas, & Fowlkes, 1997). Teams can be also either temporary with finite time line or a permanent feature of organizations. In this study, consistent with the widely recognized definition of Salas et al. (1992), a team is defined as a distinguishable set of two or more individuals who interact interdependently with a limited life-span of membership in order to accomplish common goal(s).

Teams and Work Groups. In this study, teams and work groups are treated as equivalent constructs as small group researchers have used the two terms interchangeably (Devine & Phillips, 200; Guzzo, 1996; Ilgen, 1999). Furthermore, few empirical studies have made any operational differences between the two terms. Therefore, in this study, the two terms, "teams" and "work groups," are used synonymously in reference to a group of employees that interact to achieve organizational goals with some degree of interdependence (Devine & Phillips, 2001). The two terms are also used interchangeably for selecting studies to be included in this investigation.

Types of Teams. Although different typologies exist, there are four types of teams commonly discussed and differentiated in the literature and are included in this study (Cohen & Bailey, 1997): (1) work teams, (2) parallel teams, (3) project teams, (4) management teams.

1) *Work Teams:* Work teams are units that perform the day-to-day functions of organizations. These teams are generally continuing organizational units with stable

and well-defined memberships and work roles. Hybrid forms of work teams, such as self-managing, semi-autonomous, and empowered work teams, are frequently employed in organizations (Cohen & Bailey, 1997; Pearson, 1992).

2) *Parallel Teams:* Parallel teams consist of individuals from various work units to perform tasks that organizations are not equipped to perform well (Ledford, Lawkler, & Mohrman, 1988; Stein & Kanter, 1980). While existing in parallel with the formal organizational structure, these teams make recommendations to higher ranks, yet lack decision authority. Quality improvement teams, employee involvement groups, and quality circles are examples of parallel teams (Cohen & Bailey, 1997).

1) *Project Teams*: Project teams perform single event tasks within a specified time frame, such as developing a new product/service, or implementing a new technology. Tasks performed by project teams involve substantial application of knowledge and judgement. Therefore, individuals from diverse functional units are often employed in project teams, as their specialized expertise is essential to complete projects. Such an example is cross-functional teams that are increasingly employed in current organizations. Once a project is completed, the members either return to their functional units or move onto the next assignment.

2) *Management Teams*: Management teams coordinate and give directions to sub-units under their responsibilities (Mohrman, Cohen, & Mohrman., 1995). They consist mainly of managers from various functional units and are responsible for overall performance of their respective business units, such as vice presidents of research and development, manufacturing, and logistics. At the pinnacle of organizations, top

management teams (TMT) direct a firm's strategic movements and share responsibilities for the success of organizations.

Effect Size. Broadly speaking, the effect size refers to any of several measures of the strength of a relationship (e.g., Pearson's *r* or eta) and is often thought of as a measure of practical significance (Newton & Rudestam, 1999). In this study, the correlation coefficient is used for measuring the magnitudes of relationships between team diversity and team outcomes.

Moderator and Moderating Effect. A moderator is a variable that influences (moderates) the relationship between two other variables and thus produces an interaction effect (Vogt, 1999). A moderating effect, also known as an interaction effect, occurs when the relationship between two variables differs depending on the value of a third variable.

Heterogeneity of Effect Sizes. In meta-analysis, heterogeneity of effect sizes arises when the studies being reviewed cannot be adequately described with a single mean effect size, as individual study outcomes are quite different from each other in terms of either magnitude or direction.

CHAPTER 2

LITERATURE REVIEW

Chapter Overview

This chapter first presents a brief overview of team practice and research to date followed by a literature review of team diversity, the focus of the current study. In doing so, two dominant and competing paradigms of team diversity, similarity-attraction and cognitive resource diversity, are compared and contrasted. The next section examines variables recognized by scholars to be of particular interest in affecting team outcomes, including bio-demographic attributes and job-related attributes. Team outcome variables, performance and social integration, are also reviewed in depth. In particular, Cox and Blake's three diversity outcomes are discussed in conjunction with the quality of performance measures. Finally, four moderators that may influence the relationships between team diversity and outcomes are explored. This review serves as the theoretical rationale for the research questions and choice of methodology used in Chapter 3 of this investigation.

A Brief History of Team Practice and Research

In the practitioner's realm, implementing work teams as a way of organizing work has been predominantly a 20th century concept, although teams have been utilized to increase productivity throughout the human history. For example, early attempts at utilizing teamwork were rare, because of the dogmatic adherence to Frederic Taylor's scientific management during the early industrial era (Porter & Beyerlein, 2000). Over

time, scholars from various disciplines recognized the importance of teamwork and subsequently investigated the phenomena. An especially notable development of research on teamwork took place during the late 1930s when the field of "group dynamics" emerged in the field of social psychology (Cartwrigth & Zander, 1968). The study of group dynamics advanced more rapidly in the U.S. after the Second World War and research on teamwork in other disciplines, such as medicince, social work, and psychology, proliferated at the same time (Lewin, 1947; Lindzey, 1954; Mead, 1966; Shaw, 1976).

In the late 1970s, teamwork became a dominant mode of organizational production, as it was believed to be synergistically compatible with service and knowledge-oriented business demands (Beyerlein, 2000). Since then, teamwork has been a popular management strategy to achieve competitive advantages in various areas, such as productivity, customer satisfaction, and employee morale.

During the 1980s and 1990s, there was a surge of interest in teamwork among management theorists and industrial/organizational (IO) psychologists, as teams were viewed as the productivity breakthrough for the ailing U.S. organizations attached by foreign competitions (Cohen & Bailey, 1997; Gist, Locke, Taylor, 1987; Guzzo & Shea, 1992; Hackman, 1987). Although several theories and paradigms from the fields of psychology and sociology were adopted by businesses, the transferability and utility of such theories remained uncertain. The major distinction between the study of small groups in the socio-psychological context and teamwork in the fields of management and I/O psychology is that the latter is nested in a profit-driven, man-made organizational context which is saturated with a myriad of practical and economical concerns. This

distinction has resulted in the proliferation of teamwork theories and models that are process and performance driven in the business and management literature. Among them, four prominent theories of teamwork in the fields of management and I/O psychology emerged: 1) sociotechnical theory, 2) group process and productivity, 3) systems theory, and 4) input-process-output models. The following section reviews these four theories of teamwork.

Sociotechnical Theory. Sociotechnical theory proposes that an organization's technology and social aspects of work are interdependent. Therefore, it is essential for organizations to balance the technical configuration of work and the social arrangement of workers in order to optimize organizational performance as well as quality of worklife (Trist & Bamforth, 1951; Trist, 1981). Sociotechnical theory also postulates that interdependent work arrangements, such as work teams or quality circles, can positively impact outcomes at the individual, team, and organizational levels. The prevalent use of interdependent work arrangements is thus a unique feature of sociotechincal theory. Most recent extension of sociotechnical theory holds that work teams interact with and are affected by organizations' larger, external environment as neither individuals nor groups exist in a vacuum (Kolodny & Kiggundu, 1980; Trist, 1981).

Group Process and Productivity. This theory, proposed by Steiner (1972), attempts to explicate the processes that influence the productivity of small, task-oriented groups. Steiner (1972) postulates that group performance is based upon the following three categories of variables: (1) task demands; (2) resources; and (3) group process. First, task demands include the requirements imposed on the group by the task itself or by the rules governing task performance. Second, resources include individual members'

abilities, skills, and tools available to perform the task. Finally, process includes both interpersonal actions that members engage in and procedural actions that they take in order to accomplish the task. Steiner argued that actual group productivity was equal to potential productivity minus losses due to faulty process. Shaw (1976) later suggested that processes could influence group productivity either positively or negatively (i.e., process gain vs. process loss).

Systems Theory. Largely borrowed from Bertalanffy's (1969) General System's Theory (GST), O'Connor (1980) proposed a systems model of teamwork that was focused on the dynamic interdependence among variables. Similarly, in investigating the phenomena of teamwork in organizations, Sundstrom, DeMeuse, and Futrell (1990) formulated an "ecological" model that was mainly based on the notion of the interconnected variables. Their model was also based on GST although the interconnected variables were modified to examine work group dynamics in organizations (organizational context, boundaries, team development, and team effectiveness). Teamwork models and paradigms within the context of GST are similar to the input-process-output models, as they emphasize the roles of process variables, interaction variables, and interconnection of team facets. However, systems models do not specify clear paths of influences as some input-process-output models do.

Input-Process-Output Models of Teamwork. Since the 1960s, the input-process-output (IPO) approach has served as the theoretical foundation for theories of team process and outcomes (Guzzo & Shea, 1992). McGrath (1984) was one of the early researchers who applied the IPO approach to analyze teamwork. In McGrath's model, there are three categories of antecedents variables of team process: 1) group composition,

2) task and environment, and 3) group structure. The first two categories of antecedents are hypothesized to influence the third category, group structure. Although McGrath (1986) suggested that his IPO cycle was a reiterative process, the general IPO model was largely based on a static, liner relationship among the three variables of input, process, and output. Hackman and Morris (1975, 1987) also proposed a model of team effectiveness, which was largely adopted from the early IPO model by McGrath. The researchers examined team design features affecting team effectiveness at three levels, individual, team, and environment. In their model, team design features consist of characteristics related to team composition, team structure, and external influences.

In 1984, Gladstein identified two main categories of inputs in her IPO model: team level inputs and organizational level inputs. Inputs at the group level include member composition (skills, heterogeneity, and organizational/job tenure) and group structure (role and goal clarity, work norms, task control, size, and leadership). In contrast, inputs at the organizational level include the available resources (training/technical consultation and the markets) and organizational structure (rewards and supervisor control or support) that may facilitate or hamper team work. Ultimately, these two categories of inputs affect the output, group effectiveness, both directly and indirectly through group process. Furthermore, there are group task variables, such as complexity, uncertainly, and interdependence, that moderate the relationship between group process and group output.

Summary of Theories and Models of Teamwork

Over the past century, a plethora of theories and models investigating teamwork has been promulgated. The constructs and propositions detailed in the four most influential theories discussed in the previous section provided insights into team diversity variables and form the framework used in the current study. The four theories also shed light on how team outcomes could be affected by antecedents of team member characteristics and other intervening variables. In the next section, theories and literature that specifically investigate the potential effect of team diversity on team outcomes are examined. In doing so, two most widely accepted theories of team diversity are delineated followed by a review of the team diversity variables used in the current study's theoretical framework.

Competing Theories of Team Diversity for Performance

Humans are social animals in that they are inclined to congregate and act in groups. During group interactions, information exchange and knowledge sharing take place, and there are a number of forces that may facilitate or hamper group processes and thus impact group outcomes. Previous sociological research has demonstrated that demographic characteristics can affect various socio-economic outcomes, such as economic well-being (Easterlin, 1980), education and mobility patterns (Stewman & Konda, 1983), and crime rates (Guttentag & Secord, 1983). However, the utility of these studies to HRD theory is not readily transferable, as organizations are uniquely differentiated from these other social aggregations. For example, unlike naturally occurring social groups, an organization is a consciously formed social unit that functions

on a relatively continuous basis to achieve a common set of goals (Robinson, 1998). Although the general concepts of demography could have substantial effects on organizational outcomes, such as innovation, performance, and management succession, it is not simply demographic characteristics that are important to understand but rather the potential compositional effects of theses variables (Pfeffer, 1983). Yet, examinations of effects of blending individual characteristics on work team outcomes are surprisingly sparse. Lawrence (1997) referred to this as the "black box" of organizational demography:

> Demographers frequently invoke untested subjective concepts to explain the relationship between demographic predictors and organizational outcomes...as a result, untested subjective concepts remain poorly defined and their relationships, timing, and context consistently underspecified. Available data substantiate this problem. The literature does not show reliable, strong relationships between demographic predictors and the subjective concepts commonly used to explain organizational outcomes...it creates a black box where contents remain unknown. (p. 20).

Lawrence further contends that the "black box approach" to organizational demography should be replaced with more theoretically grounded, systematic, and dynamic models to clarify the effects of demography on organizational outcomes.

A review of the literature shows that there are two dominant theories of team work particularly regarding the effects of team diversity on team outcomes: 1) the similarity-attraction paradigm (Byrne, 1971; Tziner, 1985) from the field of social

psychology, and 2) the cognitive resource diversity theory from the field of management (Cox & Blake, 1991; Easely, 2001). Although both theories predict that team outcomes are largely affected by team composition, their predictions are grounded in distinctively different assumptions.

Similarity-Attraction Paradigm

Proponents favoring the similarity-attraction paradigm of team composition argue that members' perceptions of others, as frequently inferred on the basis of similarity in attitudinal and demographic attributes, lead to attraction among team members (Byrne, 1971; Caldwell, & Barnett, 1989; Smith, Smith, Olian, Sims, & Scully, 1994; Tziner, 1985). For example, bio-demographic attributes, such as age, gender, and race/ethnicity, are immediately observed and further categorized by individual members, and differences are negatively associated with team performance and social integration (Jackson, May, & Whitney, 1995; Milliken & Martins, 1996; O'Reilly; Wiserman & Bantel, 1992).

According to the paradigm, homogeneous teams are likely to be more productive than heterogeneous teams due to mutual attraction of team members with similar characteristics. Heterogeneous groups, on the other hand, are hypothesized to be less productive and have lower team cohesion because of inherent tensions and relational conflicts arising from member differences. For example, an empirical study by Weirsema and Bantel (1992) found that homogeneity of demographic traits led to a shared language among individuals that in turn enhanced their communication frequency and integration. Consequently, the homogeneous teams performed better than their heterogeneous counterpart on tasks requiring coordinated activities among team members. Similarly,

Kirchmeyer (1995) found that diverse employees in terms of age, education, and lifestyle perceived the lowest level of job challenge and work team fit.

Cognitive Resource Diversity Theory

Using the theoretical argument of cognitive resource diversity, researchers of this position have argued that diversity has a positive impact on team performance due to unique cognitive resources that each member brings to the team (Cox & Blake, 1991; Hambrick, Cho, & Chen, 1996). The underlying assumption of value-in-diversity is that teams consisting of heterogeneous members promote creativity, innovation, and problem-solving and thus generate more informed decisions.

There is evidence supporting this proposition. Kanter (1983) reported that the most innovative companies deliberately established heterogeneous teams to capitalize on multiplicity of views while avoiding the pitfall of group-think (Janis, 1972). Similarly, Nemeth (1986) found that heterogeneous teams that included minority members were more creative in generating ideas and stimulating consideration of non-obvious alternatives than homogeneous teams. Further, the results indicated that the heterogeneous teams were more creative in solving problems than the homogeneous teams when controlling for ability levels. In a more recent study, Simons and colleagues (1999) observed that member diversity in education and company tenure influenced the quality of debates and thus positively impacted the decision-making process in a team of top managers. In sum, supporters of the cognitive diversity perspective suggest that diverse individuals with varying experiential, educational, and racial/ethnic backgrounds add more dimensions to problem-solving and decision making processes while providing multiple perspectives on issues.

Competing Nature of the Two Theories

While there is a theoretical conviction that heterogeneous teams will be more successful due to the cognitive diversity of members, such attributes can be also counterproductive as heterogeneity may produce detrimental conflict. The similarity-attraction paradigm predicts that homogeneous team members work well with one another due to their shared characteristics thereby creating a synergistic effect on performance. In contrast, the cognitive resource diversity theory posits that rich and diverse inputs from heterogeneous team members greatly enhance teams' performance. While reflecting the conflicting nature of the two theories, the literature on team diversity has reported mixed findings on how compositional variables may influence team processes and outcomes.

Different Dimensions of Team Diversity: Existing Frameworks

One of the challenges of synthesizing the team diversity literature is to determine the appropriate composition of variables that influence outcomes in teams (Bowers, Pharmer, & Salas, 2000). Campion et al. (1993) formulated a model of work group outcomes based on the synthesis of several previous models and summaries. Specifically, the researchers suggested the following five categories affect team outcomes: 1) job design, 2) task interdependence, 3) group composition, 4) organizational context, and 5) group process. In their narrative review, Jackson, May, and Whitney (1995) drew a distinction between readily detectable and less observable team diversity, in which the former represented bio-demographic markers, and the latter indicated ability and cognitive resources. Pelled (1996) expanded the team diversity literature by categorizing

diversity into two major themes: highly job-related and less-job-related attributes. In her model, job relatedness was operationally defined as the extent to which the attribute reflects experience, skills, or perspectives pertinent to cognitive work tasks. Pelled used her analysis to argue that highly job-related attributes, such as functional expertise, education, or industry background, had a stronger impact on team performance than less job-related attributes. Harrison, Price, and Bell (1998) examined the impact of surface-level (demographic) and deep-level (attitudinal) diversity on team social integration. The researchers defined "surface-level" diversity as differences among team members in immediately observable biological characteristics, such as age, gender, and race/ethnicity. "Deep-level diversity", on the other hand, was defined as differences among members' attitudes, beliefs, and values that were not readily detectable but over time learned through member interactions.

From the various taxonomies, a dichotomous classification of team diversity has emerged: 1) bio-demographic characteristics, such as age, gender, and race/ethnicity that are less germane to the team's task and 2) job-related characteristics, such as functional expertise, education, and organizational tenure which are more relevant to the team's task. These two categories accurately capture individual characteristics that make up diverse teams and further reflect the common themes in the various frameworks found in the team literature. Therefore, in the current study, bio-demographic and job-related characteristics are used to investigate the relationship between team diversity and outcomes, as the terminology is similar to those found in the theoretical works in the field.

Review of Team Diversity Variables

To date, researchers have examined a wide range of team diversity variables and their effects on team outcomes. This review section organizes the findings of this research based on the six diversity variables under the two categories: bio-demographic and job-related diversity.

Bio-demographic Attributes

Age. Prior to 1990, the literature illuminated the positive aspects of age similarity in team members. The underlying logic of the positive effect of age similarity is that individuals similar in age are more likely to share perspectives as they have gone through relatively similar events and life experiences than individuals diverse in age. Consequently, age similarity tends to facilitate shared understating and communication among team members thereby positively influencing social integration.

A great deal of research was done on examining the effect of age diversity on turnover intentions and performance ratings. For example, O'Reilly and colleagues (1989) reported that age heterogeneity was related to low levels of social integration, which in turn influenced turnover intentions, among convenience-store chain employees. Wagner , Pfeffer, and O'Reilly (1984) similarly found that upper-level managers were more likely to leave when they perceived age dissimilarity among members in a sample of thirty-one Fortune 500 companies. Pelled, Xin, and Weiss (2001) showed that age dissimilarity led to increased emotional conflict in a Mexican production facility.

Several studies have reported that age similarity enhances the frequency of communication and the degree of favorable perceptions among members of work teams,

while dissimilarity in age is often assumed as having a negative influence on team processes (Rhodes, 1983; Tsui, Egan, & O'Reilly, 1992; Zenger & Lawrence, 1989). Zenger and Lawrence (1989), for example, found that age similarity was one of the factors influencing the frequency of technical communication in a sample of project teams in an U.S. electronic firms' research division. Tsui and O'Reilly (1989) observed that differences in superior-subordinate dyads in terms of age, education, race, and gender were associated with supervisor's low rating of subordinates' effectiveness. Judge and Ferris (1993) also found that differences in superior-subordinate age negatively influenced supervisors' ratings of subordinate's performance ratings.

Recently, research has shifted its focus on the potentially positive consequences of age diversity. In the case of top management teams, a number of researchers discovered that younger managers were more inclined to pursue aggressive strategies while their senior counterparts required more time to formulate strategies and take action (Hambrick & Mason, 1984; Hambrick, 1994). Although there is evidence that age diversity is negatively associated with team cohesion, some scholars argue that having diversely aged members brings a wider range of perspectives and experiences that improve team decision quality (Cox & Blake, 1991; Lawarence, 1994; Pelled, 1996). In summary, the effect of age diversity on team outcomes is still inconclusive in the current literature. Consequently, the research on the topic suggests that age similarity/dissimilarity in teams does not always results in uniform outcomes.

Gender. Although gender research has been conducted for decades, there is a paucity of empirical studies examining the effect of gender on team performance, especially with respect to team judgements and decision-making tasks (Rogelberg &

Rummery, 1996). Of studies that have examined gender effect in team settings, many report that gender diversity has a negative impact on teamwork. Tsui and O'Reilly (1989), for example, reported that subordinates whose sex differed from their supervisors' received lower performance ratings. Pelled (1996) observed that gender diversity in work teams resulted in intragroup conflict and lower performance ratings in work teams in electronics manufacturing facilities. Some argue that while mixed-gender teams have the potential to outperform same-gender teams, varying interaction and communication styles between men and women may induce process losses in mixed-gender teams (Kanter, 1977; Shaw, 1981).

However, one positive finding of gender diversity's impact on team is that balanced mixed-gender teams may be more advantageous than all-male or all-female teams (Martin, 1985; Kanter, 1977; Smith-Lovin, Skvoretz, & Hudson, 1986). In her integrative review on the effect of gender composition on team performance, Wood (1987) found a small yet positive effect of mixed-gender teams on team performance. In explaining the superiority of mixed-gender groups, the researcher notes:

> A more plausible explanation for the slight superiority of mixed-sex groups is the heterogeneity of interaction styles that characterizes this type of group. Maybe the combination of men's and women's interaction styles in mixed-sex groups equipped the group to be moderately effective both at tasks requiring task activity and at those requiring social activity. (p. 70).

As reflected in Wood's explanation, the underlying logic of the superiority of balanced mixed-gender teams is that men tend to benefit, as the presence of women provides them with more opportunities to participate and communicate in team work processes.

Likewise, women are likely to benefit as the presence of men in teams adds legitimacy to task-oriented goals and pursuits.

Overall, the existing research on the consequences of gender diversity in teamwork has demonstrated moderately conflicting results. In a military personnel study, Pulakos and associates (1989) found that rater-ratee similarity in gender was not significantly related to performance ratings. Tusi, Eagan, and O'Reilly (1992) reported that the organizational attachment of white male employees decreased, as diversity in gender increased, but that of female employees did not. Although there seems to be a consensus on the potential benefits of gender diversity in teamwork, current findings are mixed and inconclusive.

Race/Ethnicity. Racial and ethnic diversity offers potential opportunities for organizations to improve their competitive positioning. Cox and Blake (1991), for example, made a convincing argument based on the marketing advantages of having a workforce composed of ethnically diverse employees. They assert that organizations can gain a competitive edge by matching the demographic characteristics of the markets that they serve with ethnically similar employees. Additionally, studies on team interaction in multiracial groups show that such teams have potential to perform better and generate more ideas and alternatives than homogeneous groups.

However, in past research, the effect of racial and ethnic diversity on team outcomes is also inconsistent. Sessa (1993) found that temporary teams varying in racial composition exhibited more conflict than racially homogeneous teams in a hospital setting. In their meta-analysis, Kraiger and Ford (1985) discovered that supervisors assigned higher performance ratings to subordinates of the same race as themselves. This

effect became more pronounced for white supervisors, as the percentage of blacks in the teams increased. Kirchmeyer (1995) similarly found that minority managers reported poorer fit with their work groups after nine months on the job than non-minority managers in a sample of Canadian companies. In a laboratory setting, Hinds and associates (2000) found that undergraduate students had the least proclivity for working in teams whose members were racially dissimilar to themselves.

Other studies, however, report positive effects of racial and ethnic diversity on team outcomes. Watson and colleagues (1993), for example, found that variation in race and ethnicity influenced both member-reported team process and performance ratings among teams of college students in their longitudinal study. Racially homogeneous teams (all white) initially reported better team process and performance than racially mixed teams; yet, the racially heterogeneous teams improved over the 17-week period and outperformed the homogeneous teams by the end of experiment (Watson, Kumar, & Michaelsen, 1993). More recently, Richard (2000) discovered that firm-level outcomes were influenced by the interaction of racial diversity and growth strategy. Similarly, racial diversity was positively related to performance for banks pursuing an innovation strategy (Richard, McMillan, Chadwick, & Dwyer, 2003). Therefore, with the contrasting theories and empirical findings, the effect of racial and ethnic diversity on team outcomes is largely undetermined in the literature.

Job-related Attributes

Functional Expertise. Functional expertise refers to an employee's work specialization and depth of relevant knowledge in an organization, such as finance,

marketing, and logistics (Bunderson, 2003). Employing functional expertise as an indicator of cognitive diversity in teams is deemed efficient, as organizations frequently structure functional groupings to carry out their business operations Thus, individual employees develop in-depth subject matter knowledge in functional areas of their choice and then are grouped with others of varying functional specializations. Consequently, functional diversity provides teams with direct access to a variety of expertise, information bases, and resources that are not readily available if all members were from the same functional areas.

The expertise of team members has been found to be positively related to team performance. For example, Eisenhardt and Tabrizi (1995) demonstrated that functional diversity was associated with faster time-to-market for new product development efforts in the computer industry. Bantel (1994) reported a positive relationship between team members' functional expertise and performance. Lant, Milliken, and Batra (1992) found functional heterogeneity was positively related to strategic reorientation in both furniture and software industry. Likewise, Govindarajan (1989) reported a positive link between managers' functional expertise and the success of business strategies.

However, heterogeneous functional expertise may also increase task conflict, complicate internal communication, and hamper coordination within teams (Ancona & Caldwell, 1992; Dougherty, 1987). Teams made up of individuals from different functional areas may find it difficult to develop a shared understanding of tasks (Dougherty, 1987). Fiol (1994) observed that when team members had different interpretations of task content issues due to their varying expertise, the team's learning and accurate assessment of the situation decreased. Similarly, Souder (1987) found that

functionally diverse teams had difficulties reaching agreements on integrated programs of action. Ancona and Caldwell (1992) were unable to detect a direct relationship between members' functional diversity and performance, while reporting a significant and negative effect of functional diversity on team cohesion.

Educational Background. A person's educational background can be a significant indicator of their knowledge, skills, and capability. Furthermore, the choice of a specific educational major may reflect one's cognitive strength and personality (Holland, 1973). For instance, an individual educated in computer science can be expected to have a somewhat different cognitive disposition than an individual educated in marketing or advertising (Hambrick & Mason, 1984). As in functional expertise, dissimilarity in educational background seems to have a positive impact on team performance, as it fosters a broader range of cognitive skills. However, educational background can also negatively affect social integration in teams (Cohen & Bailey, 1997).

Overall, studies investigating the effect of educational diversity on team outcomes are relatively few as compared to the research examining other demographic variables in teamwork. In a laboratory setting, Jackson et al. (1991) discovered that heterogeneity in education level (undergraduate versus graduate) was associated with turnover intention. Wide differences in educational background led to an increase in task-related debates among work teams (Jehn, Chatwick, & Thatcher, 1997). In their study of Japanese top management teams, Wiersema and Bird (1993) reported that differences in university prestige were associated with member turnover rates. The researchers note that heterogeneous educational backgrounds tend to increase the level of discomfort and conflict among members thereby decreasing social integration in teams.

In contrast, Cohen and Levinthal (1990) contend that the absorptive capacity of the organization is likely to increase with variety in knowledge structures as reflected in diverse educational majors. Jehn, Northcraft, and Neale (1999) observed that informational diversity, such as education and functional areas, was positively related to actual work group performance although the relationship was mediated by task conflict. Carpenter and Fredrickson (2001) similarly reported that international experience and diverse educational background were positively related to firms' global strategic postures among top management teams. Therefore, findings on the impact of educational diversity on team outcomes are mixed in the literature.

Organizational Tenure. The effect of tenure heterogeneity on team outcomes has been largely inconclusive with varying empirical results. Tenure homogeneity is generally associated with team members' familiarity of policies, procedures, political and situational factors in organizations and thus potentially offers the advantage of less communication interruptions, power struggles, and conflict due to shared languages and organizational identity.

As in age diversity, several studies were conducted regarding the effect of organizational tenure diversity on social integration and turnover in teams. For example, O'Reilly et al. (1989) found that tenure diversity resulted in lower levels of team cohesion, which in turn was related to higher turnover. O'Reilly, Snyder, and Boothe (1993) similarly discovered that tenure diversity was related to less open communications among members in top management teams. In a university setting, McCain, O'Reilly, and Pfeffer (1983) observed that tenure similarity among faculty within departments was related to lower turnover. Several researchers argue that work teams with homogeneous

organizational tenure tend to have a high level of team cohesion and social integration (Michel & Hambrick, 1992; O'Reilly, caldwell, & Barnett, 1989). However, this proposition has not always received support, as some studies have failed to detect such relationship between tenure diversity and social integration. Pelled et al. (2001), for example, reported that tenure diversity was negatively related to both task and emotional conflict in work teams.

Teams with lengthy and homogeneous tenure can increase reluctance to organizational changes and innovations while maintaining the status quo (Hambrick & Mason, 1984; Michel & Hambrick, 1992). A number of studies reported that lengthy organizational tenure was associated with top management teams' unwillingness to make strategic changes (Bantel & Jackson, 1989; Finkelstein & Hambrick, 1996; Katz, 1982). In contrast, there is evidence that tenure heterogeneity increases the chance that teams challenge past practices and are more open to change, thereby creating a impetus for organizational flexibility and strategic changes (Boeker, 1997; Dutton & Duncan, 1987; Katz 1982). Heterogeneous organizational tenure also suggests that team members differ in their organizational experiences and bring varied perspectives to issues, which works favorably for developing more informed strategic alternatives. Wiersema and Bantel (1992), for example, observed that top management teams with shorter and heterogeneous tenure initiated more corporate strategy changes than management teams with longer and homogeneous tenure in a sample of Fortune 500 companies. Boeker (1997) similarly demonstrated top management tenure diversity was positively associated with the level of strategic changes.

Summary of the Literature on Team Diversity Variables

The empirical studies of the six categories of team diversity are characterized by inconsistent and mixed results. One possible reason for these inconsistencies is that there may be a variation of magnitudes in the relationships between team diversity and team outcomes. As suggested by Webber and Donaheu (2001), no unified relationship can be found. Rather, different types of diversity may have different impacts on team outcomes. To resolve the inconsistent findings in the literature, this study explored the overall impact of team diversity on team outcomes. Furthermore, grounded in both the cognitive resource diversity theory and the similarity-attraction paradigm, the current study speculated that there would be potentially varying effects of team diversity characteristics on team outcomes. The ensuing section discusses the research findings related to the two types of team outcomes, team performance and social integration.

Review of Team Outcome Variables

Team Outcomes: Performance and Social integration

Team performance is not a unitary construct. Rather, it has multifaceted dimensions that should be examined in operationalizing the construct, such as cost, volume, knowledge/value creation, and innovation. According to Dunphy and Bryant (1996), a majority of team research has focused on measuring firms' operational and quantitative objectives as team outcomes. A few examples include volume of sales, number of units produced, and return on equity. Although it has been increasingly addressed in the recent literature, there is still a relative paucity of research linking team performance to strategic and qualitative objectives (i.e., quality of creativity and

innovation or effectiveness of decision-making) as well as psychological goals. Therefore, in this study, the three domains of team performance, quality, quantity, and social integration, are meta-analyzed to encompass operational, strategic, and psychological aspects of team outcomes. Based on Cox and Blake's diversity outcomes, the quality of performance is further subcategorized into: 1) quality of decision-making, 2) quality of problem-solving, and 3) quality of creativity/innovation. The quantity of performance is investigated by examining the following two categories: 1) the number of ideas/outputs generated, and 2) time to complete a team task. Finally, membership satisfaction and cohesion to team are investigated to measure the affective outcomes of teamwork, social integration. The next section summarizes the literature review with respect to the three categories of the quality of performance.

The Three Measures of the Quality of Performance: Cox and Blake's Diversity Outcomes

The hypothesis that team work is more effective in accomplishing organizational goals than individual performance has been the subject of a significant amount of research (Davis, 1969, 1982; Hastie, 1986). In the realm of behavioral and social sciences, it has been argued that the synergistic performance of a group is more productive than that of an individual for generating ideas and solving problems. Consistent with the argument made by social and behavioral scientists, business and management scholars have also documented the advantages of using teams in organizations. In particular, with the increasing number of diverse employees in the workplace, a great deal of attention has been paid to diversity in teams and how it relates to the effectiveness of teamwork.

In their seminal article on the benefits of work force diversity, Cox and Blake (1991) enumerate several competitive advantages of using diverse employees in organizations. The researchers contend that having diverse employees can provide organizations with increased flexibility, creativity and problem-solving solutions, resource acquisition, marketing advantages, and reduced costs. The three variables measuring the quality of performance used in this study are adopted from Cox and Blake's diversity outcomes (1991). The three variables are selected as the measures of performance quality as they accurately capture the potential competitive advantages of having diverse employees in teams. One caveat is that although their diversity outcomes are widely accepted, to date there have been few empirical reviews that examine individual studies to validate Cox and Blake's diversity outcomes. The current study is thus the first empirical synthesis to meta-analyze the effects of diversity on team outcomes using Cox and Blake's classifications. The following section addresses the three variable of performance quality adopted from Cox and Blake's classifications with a summary of the relevant literature.

Decision Making. Work teams often seek compliance and consensus in decision making process. Although compliance and consensus are necessary for teams to carry out goals, pressures and consensus seeking behavior can also engender several pitfalls. Among them, "groupthink" is a well-known problem resulting from group consensus seeking behavior. Janis (1972) observed that this extreme consensus seeking in teams can often inhibit the generation and assessment of alternative solutions to problems thereby producing sub-optimal outcomes in team performance. One way to cope with this potential pitfall is to enact measures to insure members to openly exchange ideas drawn

from their diverse experiences. Team member diversity can thus have positive effects on decision making as long as it promotes healthy debates and dissents (Williams & O'Reilly, 1998).

Several researchers have investigated the positive impact of team diversity on the quality and process of decision making in teams. Kirchmeyer and Cohen (1992) found that with an increasing use of constructive conflict, ethnically diverse student teams encouraged a variety of opinions and open discussions, which in turn positively influenced team outcomes. Dooley and Frywell (1999) revealed that member disagreement was associated with higher decision quality in strategic decision-making teams in U.S. hospitals. Peterson (1997) observed that team leaders' openness to minority member dissent facilitated the quality of team processes and outcomes. Peterson, Owens, Tetlock, Fan, and Martorana (1998) also found that successful top management teams encouraged debates and discussions as a way to stimulate their decision-making process. In a similar vein, research examining the impact of using a devil's advocate (a team member who challenges the status quo of the team) showed that exposure to minority dissent improved the quality of team decision making (Schwenk, 1990).

However, research has also demonstrated cases where team heterogeneity can have potentially negative effects on strategic decision-making (Cho, Hambrick, & Chen, 1994; Priem, 1990). While member heterogeneity improves decision quality, widely varying perspectives and opinions among members can also make decision consensus difficult and time consuming (Nemeth, & Staw, 1989). This can be particularly deleterious in situations where quick decision making is essential. As Amason and Schweiger (1994) note, while a certain amount of diversity is necessary for quality

strategic decision making, it can also engender person-related conflict that may hamper effective teamwork process. Therefore, conflict arising from member heterogeneity can have both beneficial and harmful effects on team decision making.

Creativity/Innovation. Organizations are placing a greater emphasis on promoting creativity and innovation as a way to compete in turbulent and uncertain markets. Simultaneously, teams have been increasingly viewed as a vehicle for developing creative ideas and innovative solutions. Reflecting this trend, there have been multiple interpretations of creativity and innovation in the team literature. Therefore, a clarification of the term is necessary prior to reviewing the findings of creativity and innovation in teamwork. In this study, creativity and innovation are defined as the generation and execution of novel and useful ideas that enhance products, services, or performance of organizations (De Dreu & West, 2001; West & Farr, 1996).

Several studies suggest that team diversity is positively related to creativity in organizations. In an early experiment by Triandis, Hall and Ewen (1965), the solution creativity of dyad teams with different attitudes and perspectives was judged to be higher than that of dyad teams with similar attitudes while controlling for ability. More recent literature concurs and further posits that member heterogeneity can act as a driving force for introducing creativity and innovation in teamwork (Albrecht & Hall, 1991; Monge, Cozzens, & Contractor, 1992; Payne, 1990).

Although benefits of member diversity seem evident in the domains of creativity and innovation, there are also potential limitations. Creativity and innovation may be hindered, as each member is more knowledgeable in one area to the exclusion of others (Ochse, 1990). For example, technical languages and jargons used by certain team

members may impede the communication among the entire team thereby making a full exchange of knowledge difficult (Maznevski, 1994). Likewise, the evidence on the beneficial effects of team diversity on creativity and innovation is somewhat inconsistent. Diehl (1992), for example, found that team member heterogeneity promoted group brainstorming of creative ideas; however, heterogeneous teams did not outperform homogeneous groups. Therefore, creativity and innovation are included as the measures of performance quality in this study to resolve some of the inconsistencies in the literature.

Problem-Solving. In one of the earliest studies of teamwork, Shaw (1932) demonstrated that the quality of solutions made by a sample of groups was superior to that of a comparable sample of individuals. Shaw explained that this general superiority of group performance was largely due to group members' ability to reject incorrect solutions and catch errors in a timely manner. The researcher's experiment revealed that team members were more likely to balance ideas, catch errors, and stimulate thought-process than individuals working alone. Since Shaw's contention of the superiority of teams in problem-solving tasks, researchers have generally theorized that team member heterogeneity is positively related to effective problem solving through widening scanning activities and varying alternatives (Eisenhardt & Schoonhoven, 1990; Keck, 1997; Pfeffer, 1981). In their later review of teamwork, Filley, House, and Kerr (1976) concluded that routine problem solving was best handled by homogeneous teams, while ill-defined and complex problems were best managed by heterogeneous teams. (Keck & Tushman, 1993; Keck, 1997).

Although a number of studies have shown the positive effects of team diversity on problem-solving performance, higher levels of variation in certain member characteristics have been also found to be negatively related to such outcomes. Dissimilarity in tenure, attitude, and experience, for example, may decrease interactions among members thereby negatively affecting problem-solving processes (Keck, 1997; Tusi & O'Reilly, 1989). Furthermore, there is evidence that heterogeneous teams may experience more conflict and less trust leading to higher turnover, absenteeism, and dissatisfaction than homogeneous teams (Alder, 1991; O'Reilly, Caldwell, & Barner, 1989; Tsui, Egan, & O'Reilly, 1992; Zenger & Lawrence, 1989). It seems that if mismanaged, member diversity can complicate the maintenance and interaction functions in teams and thus impede an effective problem-solving process.

The Measures of the Quantity of Performance

Team performance is also defined by operational and quantitative measures that are frequently employed in the current literature. In the team literature, operational measures of team performance frequently include both quantity and measurable behavioral outcomes, such as the amount of outputs produced, productivity, and time to complete a task (Bailey & Cohen, 1997). Reflecting the quantitative measures of performance in the team literature, the current study selected the following two measures to assess the quantitative aspects of team outcomes: 1) the number of ideas or outputs generated, and 2) time to complete a team task (Cohen & Bailey, 1997; Drazin & Van de Ven, 1987). The following section discusses the findings from the literature with respect to the two quantitative measures.

Number of Ideas/Outputs Generated. Idea generation is a widely studied team activity (Paulus, Dzindolet, Poletes, & Camacho, 1993; Valacich, Wheeler, Mennecke, & Wacheter, 1995). One of the major benefits of using a heterogeneous team in idea generation is that heterogeneous members bring multiple perspectives and information to the team and thus produce qualitatively and quantitatively better ideas than members with similar characteristics. Furthermore, interaction among diverse members might plausibly lead to mutual stimulation, learning, and synergy to generate a large number of potentially novel and useful ideas (Valacich et al, 1995). For example, brainstorming, a method to generate multiple ideas, has been one of the most frequently used team strategies to facilitate high-quality solutions and decisions (Diehl & Stroebe, 1987, 1990).

Time to Complete a Team Task. Diverse skills and knowledge of team members have been positively related to time-related team performance. Eisenhardt and Tabrizi (1995) demonstrated that functional diversity was associated with faster time-to-market for new product development efforts in the computer industry. Olson, Walker, and Ruekert (1995) studied 45 new product development groups and found that functional diversity enhanced effectiveness and timeliness in developing an innovative product. There is also a positive impact of bio-demographic diversity on timeliness in teamwork. Hambrick and associates (1984, 1996), for example, found that junior executives took shorter time to evaluate and execute innovative strategies than their senior counterparts. Overall, research seems to posit that heterogeneous members can provide teams with diverse knowledge and information base thereby resulting in superior schedule performance and timeliness as compared to teams consisting of homogeneous members (Ancona & Caldwell, 1992; Bantel & Jackson, 1989).

The Measures of Social Integration

Adopting from Goodman, Ravlin, and Schminke's (1987)'s conceptualization, social integration is represented by member satisfaction and cohesion to team. The ensuing section summarizes the findings of past research regarding the relationships between team diversity and the two categories of social integration.

Member Satisfaction. Witteman (1991) defines member satisfaction as an affective response that members have to some element pertaining to a small group. Member satisfaction can be influenced by a number of factors inherent in team processes (Budman, Soldz, Demby, Davis, & Merry, 1990). For instance, those who value interpersonal relationships are more likely to be satisfied with members who share similar values and beliefs than others emphasizing task-related aspects of team activities.

Research indicates that diverse teams are more likely to experience high levels of member dissatisfaction with increasing conflict due to heterogeneous member characteristics (William & O'Reilly, 1998). However, the uniform negative effect of conflict on team member satisfaction has been recently challenged with the evidence that detrimental effects are more pronounced in person-related conflict than task-related conflict (Mortensen & Hinds, 2001; O'Reilly, Williams, & Barsade, 1997; Pelled, 1996). Person-related conflict is often associated with members' visible bio-demographic attributes, as this type of conflict arises from differing personal views, beliefs, and values. Task-related conflict, on the other hand, stems from members' varying levels of task knowledge, experience, and expertise resulting in disagreements on task-related issues. In person-related conflicts, members tend to focus on emotional issues stemming from personality and personal differences rather than issues more pertinent to tasks. Several

studies report that person-related conflict has more detrimental effects on member satisfaction than task-related conflict (Baron, 1991; Jehn, 1995, 1996; Pelled, Eisenhardt, & Xin, 1999).

Team Cohesion. Team cohesion is defined as the dynamic process of team members' willingness and attempts to remain intact in order to achieve team goals (Carron, 1982). One of the salient outcomes of teamwork is to achieve an well-integrated team to effectively accomplish a task, and high levels of team cohesion are often associated with successful accomplishments of team tasks (Beeber & Schmitt, 1986; Mudrack, 1989; Gully, Devine, & Whitney, 1995). As the similarity-attraction paradigm predicts, it seems to be logical that individuals with similar backgrounds and attitudes get along better than people with dissimilar values and attitudes. Consistent with the prediction by the similarity-attraction paradigm, team diversity tends to have a negative impact on team cohesion due to increased relational conflicts among heterogeneous team members (O'Reilly, Caldwell, & Barnett, 1989; Evans & Jarvis, 1980; Pelled, 1996).

Although a number of studies report a negative relationship between team diversity and team cohesion, there is a growing support that differential effects of team diversity on team outcomes exist. In particular, many researchers believe that the negative impact of bio-demographic diversity on team cohesion is stronger than that of job-related diversity (Jehn, Northcraft, & Neale, 1999; Pelled, Eisenhardt, & Xin, 1999; Weber & Donahue, 2001). The rationale is that easily observable attributes, such as race, gender, and ethnicity, immediately lead to social categorization among team members thereby increasing the proclivity for intercategory clashes.

Moderators Affecting the Relationships between Team diversity and Team Outcomes

Substantial heterogeneity in results indicates the presence of third variables moderating the relationships between team diversity and related outcomes and thus further tests are necessary. A careful review of the team literature identifies the following four conceptually-based moderators that may influence the relationships between team diversity and team outcomes: (1) team size, (2) task complexity, (3) team type, and (4) team setting. The nature and extent of these moderators are discussed in the following section.

Team size. Although large teams can generate more outputs as additional members add resources and skills to teams, additional members can also complicate the amount of possible simple interactions thereby decreasing satisfaction and trust among members (Gully, Devine, & Whitney, 1995; Magjuka & Baldwin, 1991). Dennis and Valacich (1994), in particular, point out there are diminishing returns of team size. As team size increases, team effectiveness increases as long as it does not go beyond some optimum team size. The optimal team size in the literature varies dependent on a number of factors inherent in teams and the nature of tasks that teams need to accomplish. A number of researchers, however, suggest that teams consisting of three to five members are ideal, as participation and coordination are likely to be more efficacious than teams with more than five members (Bray, Kerr, & Atkin, 1978; Fern, 1982; Hare, 1981; Shaw, 1981). Beyond the optimum size, there seems to be increasing process losses and decreasing team integration, which surpasses gains from a large team size. Overall, there seems to be a strong theoretical argument that small teams lead to increased team cohesiveness, better communication, and coordination. Team size is therefore included as

a hypothesized moderator that may affect the relationships between team diversity and team outcomes.

Task Complexity. The effects of member diversity on team performance are likely to be affected by structural aspects of the task (Van de Ven & Ferry, 1980). For example, in accomplishing a highly complex and uncertain task, it is necessary for team members to pull together their diverse functional expertise and resources to formulate strategies to deal with such task. However, member diversity can be unnecessary or even counterproductive in dealing with a simple, routine team task (Amason & Schweiger, 1995; Fiol, 1994; Jehn, 1995). As can be inferred, in highly complex tasks, diverse expertise and functional backgrounds should theoretically be more beneficial than in routine, less complex tasks. Indeed, Bowers et al. (2000) found a significant relationship between task complexity and the team performance effect. Their results suggest that, for a low complex task, moderate gains in performance can be expected from teams in which individual members are of like gender, attitude, and ability. In highly complex tasks, it appears that the opposite result may be true; teams with heterogeneous members perform significantly better than their homogeneous counterparts. As suggested in the literature, task complexity is investigated as a potential moderator affecting the relationships between team diversity and outcomes.

Team Type. Recently, several researchers have emphasized the distinctions among various teams employed in organizations (Cannon-Bower, Oser, & Flanagan, 1992 Cohen & Bailey, 1997). For example, Arrow and McGrath (1995) distinguish teams in terms of differences in their members, tasks, and tools. Likewise, Cohen and Bailey (1997) differentiate teams into work teams, project teams, parallel teams, and top

management teams. Team type can potentially moderate the effectiveness of teamwork, as there is a strong theoretical argument that highly job-related diversity reflected in upper-level teams tends to have a stronger impact on team performance than bio-demographic diversity found in lower-level teams. Consistent with the argument, several studies have found that the relationship between team diversity and performance is stronger for upper-level management teams whose members are functionally heterogeneous than non-management teams with functionally homogeneous members (Amason, & Mooney, 1999; Bantel & Jackson, 1989; Bantel, 1994). Therefore, team type is included as a potential moderator affecting the relationship between team diversity and team outcomes.

Overall Assessment of Literature Findings

The vast literature on team diversity demonstrates its importance to organizational researchers as a critical area by which organizational efficacy and competitive advantages can potentially be enhanced. A number of studies suggest that under certain conditions, team diversity can either enhance or hinder the operational effectiveness of teamwork. However, not all findings have concurred that such effects are significant. Considering the mixed findings in the current team literature, it is not surprising that Williams and O'Reilly (1998) concluded that there were no consistent main effects of team diversity on organizational performance. In uncovering the reason for the mixed results in the topic, Webber and Donahue (2001) further speculated that these mixed findings might be due to the fact that different types of diversity have different impacts on team outcomes. Ancona and Caldwell (1992) comment on the inconsistent results found in the team diversity literature:

> Taken together, these [inconsistent] findings show the complexity with which the demography of a group can influence outcomes. Further, they suggest that our models of group demography have to become more clearly specified with respect to type of diversity, the type of group process under investigation, the performance being assessed, and perhaps even the nature of the group's task. (p. 337).

Therefore, given the plethora of conflicting results in the literature and the significant amount of research conducted on team diversity, the field can benefit from a formalized statistical synthesis of the research as a means of testing the potential impact that team diversity has on team outcomes.

CHAPTER 3

METHODOLOGY

Chapter Overview

This chapter is divided into two sections. The first section, "Research Objectives and Questions" draws upon the rationale provided in the previous chapter's literature review to formally state the research objectives, research questions, and the null hypotheses that this study examined. The second section, "Research Methods: Meta-Analytic Modeling and Analytic Framework" provides the basic theory of meta-analysis as a research methodology, and then specifically details how the method was used to explore the research questions in this investigation.

Research Objectives and Questions

Based on the review of the empirical studies, the following null hypotheses delineated from the overarching research objectives and questions were examined in this study.

Research Objective 1: Measure the overall relationships between team diversity and team outcomes

1. What is the relationship between job-related diversity and team performance?

   Null Hypotheses 1a: There is no significant relationship between job-related diversity and the quality of team performance.

   Null Hypotheses 1b: There is no significant relationship between job-related diversity and the quantity of team performance.

2. What is the relationship between bio-demographic diversity and team performance?

   Null Hypotheses 2a: There is no significant relationship between bio-demographic diversity and the quality of team performance.

   Null Hypotheses 2b: There is no significant relationship between bio-demographic diversity and the quantity of team performance.

3. What is the relationship between job-related diversity and social integration?

   Null Hypotheses 4: There is no significant relationship between job-related diversity and social integration.

4. What is the relationship between bio-demographic diversity and social integration?

   Null Hypotheses 5: There is no significant relationship between bio-demographic diversity and social integration.

Research Objective 2: Assess the varying impacts of the two types of team diversity on team outcomes.

5. Does job-related diversity have a greater impact on team performance than bio-demographic diversity?

   Null Hypothesis 5a: There is no significant difference between job-related diversity and bio-demographic diversity regarding their impacts on the quality of team performance.

Null Hypothesis 5b: There is no significant difference between job-related diversity and bio-demographic diversity regarding their impacts on the quantity of team performance.

6. Does bio-demographic diversity have a greater impact on social integration than job-related diversity?

   Null Hypothesis 6: There is no significant difference between job-related diversity and bio-demographic diversity regarding their impacts on social integration.

Research Objective 3: Examine the effects of potential moderators on the relationships between team diversity and team outcomes in the presence of heterogeneous effect sizes.

7. Do any of the moderators explain the effect size heterogeneity in the relationship between team diversity and team outcomes?

   Null Hypothesis 7: None of the moderators affect the relationship between team diversity and team outcomes in the presence of heterogeneous effect sizes.

Research Method: Meta-Analytic Modeling and Analytical Framework

Because of its data-synthesizing capabilities, meta-analysis has become widely used over the past few decades. Many experts believe that meta-analysis provides a more conclusive summary of prior research than narrative reviews (Hedges & Olkin, 1985; Hunter & Schdmit, 1990; Lipsey, 1992; Rosenthal, 1986). Performing a meta-analysis requires defining the relationship to be examined, gathering the relevant empirical reports from the literature, and then converting the data to summary statistics.

According to Cooper (1984), one should consider three criteria in selecting a meta-analytic topic. First, a well-established body of literature in terms of both quantity and quality should exist. For meta-analytic findings to be effective and valued, it is necessary that a substantial amount of research has been conducted on the subject of interest; thus, a researcher can draw enough studies to meta-analyze. Second, studies should be empirically-based, as meta-analysis is a summary based on a quantification of statistical information provided in studies. Third, it is essential that a meta-analytic topic be an area where past results have proven inconclusive or mixed. If the majority of studies show the same results, a meta-analysis of the topic would contribute little to the field. Other reasons for conducting a meta-analysis are the theoretical as well as practical significance of the topic and the need to summarize past research to inform others and advance the field.

As demonstrated in Chapter 2, there is significant inconsistency in research on the effects of team diversity on team outcomes in the current literature. Meta-analysis was thus used in this study because of the large body of research accumulated on the topic as

well as the inconsistency within the findings in the literature. In this study, six steps were employed in conducting a meta-analysis (Durlak & Lipsey, 1991):

1) A common conceptual topic shared among the studies was identified: The effects of team diversity characteristics on team outcomes were identified as a conceptual topic to be meta-analyzed.
2) The characteristics under which studies were included and excluded were operationalized: The majority of the included studies were correlational studies investigating the relationships between team diversity and team outcomes. Quantitative studies examining the effects of any of the moderating variables on the relationship were also included.
3) The literature base for usable studies was systematically searched: Both computerized and manual search of the relevant literature were conducted.
4) Statistical information from individual studies was extracted and meta-analyzed to estimate effect sizes.
5) When the assumption of the homogeneity of effect sizes was not met, post-hoc analyses were conducted to explain variability among the effect sizes by analyzing conceptually-based moderators. In order to conduct moderator tests, a coding scheme that captured the following four moderators was developed: 1) team type, 2) team size, 3) team setting, and 4) task complexity (see Appendix B).
6) The findings were presented in a way that accurately summarized the literature.

Computerized and Manual Search of Literature

A through literature search was conducted to identify studies of diversity in teams from 1980 to present. This time period was selected, as the interest in the use of teams in the workplace substantially increased during this time. Both computerized and manual literature search were conducted and the results included the following academic publications:

- Computerized Search Database: ERIC, PsychInfo, and Dissertation Abstract International.
- Manual Search of Literature: All volumes of the following journals from 1980 to 2003 were manually searched for relevant articles: Administrative Science Quarterly, Performance Improvement Quarterly, Small Group Research, Journal of Applied Psychology, Journal of Academy of Management, Personnel Psychology, Group and Organization Studies/Management, Organizational Behavior and Human Decision Processes/Performance, Human Relations, International Journal of Conflict Management, and Small Group Research.
- Effort was made to contact authors who had conducted on team diversity in the past in order to collect unpublished research. E-mail was sent to authors of articles located through the computerized search.

Criteria for Inclusion in the Study

Studies were included if they manipulated or measured any of the constructs of interest and provided the necessary statistical information to compute effect sizes. The criteria for inclusion in the analysis were as follows: 1) correlational studies investigating the relationships between any of the team diversity variables and performance/social

integration outcomes, and 2) quantitative studies examining the effects of any of the moderating variables. A complete list of the studies included in this meta-analysis can be found in Appendix A.

Instrumentation: Coding Form

Coding forms can be equated with questionnaires or interview forms in other types of research. Therefore, a coding form, as an information-gathering instrument, was developed for identifying pertinent information from studies included in this meta-analysis. The form was intended to capture study-specific correlations as well as demographic information, such as an author's name, publication type and year, and study setting (the coding form can be found in Appendix B).

More specifically, 21 pieces of information from four categories were gathered from each study. First, the study identification category included the first author's last name, the year of publication, the name of publication, a team size, and team outcome variables. Second, team diversity category contained statistical information on the six variables of team diversity: 1) age, 2) gender, 3) race/ethnicity, 4) functional expertise, 5) educational background, and 6) organizational tenure. Finally, information on four a prioiri moderators were documented on the coding form (see Table 1). A complete list of individual studies with coded variables and statistical information can be found in Appendix A.

Description of the Coding Procedures for Moderators

A moderator is a variable that influences the relationship between two other variables thereby producing an interaction effect (Vogt, 1999). A moderating effect, also known as an interaction effect, occurs when the relation between two variables differs

depending on the value of a third variable. In meta-analysis, a moderator analysis can show that effect sizes differ in magnitude between the subgroups established by dividing studies into classes based on conceptually-based third variables or study characteristics (Johnson & Eagly, 2000).

A careful review of the team literature identified the following four conceptually-based moderators: (1) team type, (2) team setting, (3) team size, and (4) task complexity. The following section details how studies were coded with respect to the four moderators.

Team Type. Studies were coded at three levels based on the team types suggested by Cohen and Bailey (1997). In this study, work teams and parallel teams were reviewed together due to the limited number of parallel team studies in the current literature. Furthermore, the distinction between the two types of teams in the literature was minor enough to consider these within the context of the same variable (Cohen & Bailey, 1997). Studies examining top management teams were coded 1, project team studies were coded 2, and studies investigating either work or parallel teams were coded 3. If a study investigated mixed teams, such as a combination of project and work teams, 99 was assigned and excluded from further analysis (see Table 1 for a complete list of the studies with moderator codes).

Team Setting. Code 1 was assigned if a study was conducted in a natural setting (i.e., real organizations) using intact teams performing real-life tasks. Code 2 was assigned if a study was conducted in a laboratory setting, such as education institutions, training centers, or military bases, using simulations. All the studies included in this study specified their study settings (see Table 1 for a complete list of individual studies with moderator codes).

Team Size. Team size was classified into two categories in this study: small (teams with 5 or fewer members) and large (teams with 6 or more members) teams. A code of 1 was assigned to a small team while 2 to a large team. When there were varying numbers of members in multiple teams within a single study, their average team size was calculated and used for the classification. If a team size was not specified, 99 was assigned and excluded from further analysis (see Table 1 for a complete list of individual studies with moderator codes).

Task Complexity. Task complexity was categorized into two broad levels, high or low complexity, depending upon the level of stimulus, uncertainty, processing demands, and response complexity within the task (Bowers, Pharmer, & Salas, 2000). Studies were coded 1 to indicate highly complex tasks if they displayed evidence of non-routine information processing, strategy formulation, or decision-making in uncertain situations. Tasks whose descriptions indicated routine tasks or little evidence of complex task characteristics were coded as low complex assigning a code of 2. For example, puzzle solving exercises in a laboratory setting or physical productions using fairly standardized procedures were coded 2. When descriptions of task complexity were available in the articles that were reviewed, this information was also taken into consideration when coding for task complexity. If there was not enough information provided in a study, 99 was assigned and excluded from analysis (see Table 1 for a complete list of individual studies with moderator codes).

Table 1 Individual Studies with Moderator Codes

Year	1st Author	Team Setting	Team Type	Team Size	Task Complexity
1996	Amason	1	1	2	99
1999	Simons	1	1	1	99
1998	Rodriguez	2	2	2	1
2001	Klein	1	99	1	99
1994	Smith	1	1	2	99
2002	Colquitt	1	3	1	2
1989	Bantel	1	1	1	2
1994	Bantel	1	1	99	2
1993	Campion	1	3	1	1
1990	Eisenhardt	1	1	2	99
1999	Pelled	1	2	1	1
2001	De Dreu	1	3	1	2
1997	Baugh	1	2	99	2
2001	Keller	1	2	1	1
2003	Randel	1	2	1	1
2001	Carpenter	1	1	1	99
1999	Dooley	1	1	1	2
2001	Lovelace	1	2	1	99
1994	Sutcliffe	1	1	2	99
1997	Boeker	1	1	99	99
2003	Martins	2	2	2	1
1993	Wiersema	1	1	2	99
1995	Harmon	2	1	2	2
1995	Harmon	2	1	2	2
1998	Harrison	1	3	1	2
1998	LePine	1	3	1	1
1996	Campion	1	3	1	2
1993	Bantel	1	1	1	99
2003	Orlitzky	2	2	2	1
2001	Mortensen	1	2	1	2
1999	Amason	1	1	2	99
2000	Tihanyi	1	1	1	2
2000	Vegt	1	2	1	2
2002	O'Connell	1	3	1	99
2000	Timmerman	1	3	1	1
1996	Cohen	1	3	1	99
1997	Jehn	2	2	2	1
1992	Lant	1	1	99	2
2000	Barsade	1	1	2	99
1992	Ancona	1	2	1	1
1989	O'Reilly	1	3	2	2

Year	1st Author	Team Setting	Team Type	Team Size	Task Complexity
1994	Keller	1	2	1	1
2003	Bunderson	1	3	1	1
1999	Jehn	1	3	1	1
2003	Bayazit	2	2	2	1
2001	Rentsch	1	99	1	99
1986	Keller	1	2	1	2
2001	Chatman	2	2	2	2
1980	Dailey	1	2	1	2
1997	Barry	2	3	2	1
2001	Miller	2	2	2	2
1995	Jehn	1	3	1	1
1999	Knight	1	1	99	2
1998	Barrick	1	3	2	99
2003	Schippers	1	99	2	99
2000	Langfred	1	3	1	2

Coding Reliability

Because each study outcome in meta-analysis represents many separate data-points, error is more consequential in the coding of such studies than error is in primary-data studies (Johnson, 1989). On this crucial issue of improving coding reliability in meta-analysis, Glass, McGaw, and Smith (1981) comment:

> The measurement problem in meta-analysis is the problem of measuring (quantifying, classifying, coding) the characteristics and findings of studies based on written reports. The principal source of measurement unreliability in meta-analyses, therefore, arises from different readers (coders) not seeing or judging characteristics of a study in the same way. Judging consistency or rater agreement is the most important consideration [if]...[t]he report itself is stable. (p.75).

Meta-analysis scholars have expressed that the validity of meta-analysis is weakened unless two or more independent subject-matter experts code study qualities

and compare their levels of agreement (Hedges & Olkin, 1989; Hunter & Schmidt, 1990; Wolfe, 1986). To assess the accuracy and reliability of coding, a second rater, who has a doctorate degree and considerable expertise in Management coded the random sample of 20 studies. A three-hour training was provided for the second rater prior to her coding of 20 studies.

Coding Training for the Second Rater

The researcher instructed the second rater on how to use the coding form to code for the study features. Each study variable was discussed in detail, and decision rules on how to code for each feature were discussed. Any questions that the second rater had were addressed by the researcher. To illustrate the use of the coding form, the researcher and the second rater jointly coded five randomly selected articles. When agreement was low for any of the dimensions, then the criteria for each questionable dimension was more closely defined for the second rater and the process was repeated. Following the training session, the second rater coded twenty randomly chosen articles by herself. The researcher met with the second rater to compare the coding results. There was a 93 % agreement in coding assigned. The discrepancies of the ratings were further discussed and eventually resulted in 100 % agreement with both raters. The percent agreement for the different study variables is presented in Appendix C. All coded and study reference data from coding forms were later entered into SPSS program.

Non-Independence

Multiple effect sizes from a single study violate the assumption of independence thereby leading to an increase in Type I or Type II error. If such problem is encountered, one must decide whether to report an average effect size in order to represent the study or

simply choose to report one effect size from multiple effect sizes in the study (Johnson & Eagly, 2000). To meet the assumption of independence, the following procedures were carried out in this study. First, only one effect size per outcome was extracted from each study unless they represented different subjects. This approach enabled the researcher to examine different outcomes while ensuring independence among the findings for each outcome (Gleser & Olkin, 1994). Second, when multiple effect sizes were provided for the same subjects for the same category of outcome, a single value from the set of correlated effect sizes was randomly selected as a final effect size for the outcome (Lou, Abrami, & D'Apollonia, 2001). Finally, effect sizes were averaged to form a single data point when data points were based on temporally repeated measures of the same outcome for the same sample in a study.

Level of Analysis

Level of analysis refers to the unit to which data are gathered for hypotheses testing and analyses (Rousseau, 1985). The level of analysis issue becomes crucial in research regarding organizational phenomenon, as organizations are nested in multiple levels (i.e., individuals, dyads, teams, and departments), which often complicates a decision of the appropriate level of analysis. For example, teams have characteristics that are distinct from individuals because social systems involve complexities not apparent in individual-level phenomena. And this very fact limits generalizability from an individual level to a team level (Bandura, 1997; Ostroff, 1993; Gully, Incalcaterra, Joshi, & Beaubien, 2002).

A number of researchers argue that theory should specify the level at which data are measured and analyzed (Chan, 1998; Morgeson & Hofmann, 1999; Rousseau, 1985).

If an aggregation of one level of data to another is done, then there should be a strong rationale or theory to justify such aggregation (Van de Ven & Ferry, 1980). For example, some team constructs, such as team size and longevity, exist at the team level apart from individual perceptions. However, by definition, team efficacy and potency are based on the shared perceptions of individual team members, which makes an aggregation of individual data to the team level appropriate.

Team is the level of analysis examined in this study. Therefore, studies investigated the phenomena at the team level were included; however, studies that collected data at the individual level and aggregated them to the team level were also included. The aggregation of individual data to the team level is warranted, as the two team outcome variables, team performance and social integration, are believed to reside in collective perceptions of individual members. It should be also noted that studies which reported data at the firm level were included in this study. Largely relying on archival sources, a majority of the studies examining top management teams gathered their data either at the firm level or aggregated to the firm level. Eliminating these studies would result in the loss of important information that shed light on the effects of team diversity (Cohen & Bailey, 1997).

Effect Size Index: Correlation Coefficient

There are two main families of effect sizes in meta-analysis, the *r* family and the *d* family. The *r* family includes a host of correlations, such as Pearson *r*, phi correlation, and point biserial *r* while the *d* family include Cohen's *d*, Hedges' *g*, and glass's delta, which essentially compare the standardized difference between two groups (Johnson, 1989; Wolfe, 1986). In meta-analysis, *r* and *d* estimates are comparable and can be

readily converted to one another; thus, it is ultimately an analyst's decision to which index she or he should convert all effect size estimates obtained.

The effect size *r* has several advantages over *d*. Notably, Rosenthal and DiMatteo (2001) comment that:

> Converting *d*'s to *r*'s makes sense as *r* in its point biserial represents the relationship between two levels of the independent variables and scores on the dependent variable, but converting the continuous Pearson *r* to the dichotomous *d* loses information...*r* allows for the analysis of trends across more than two groups, where as *d* is limited two...Also, *r* is more simply interpreted in terms of practical importance than *d* or *g*. (p.70).

r was chosen as the effect size index in this study, as the majority of the studies on team diversity were based on observational research rather than randomized experiments. In addition, as compared to *d* or *g*, *r* provides easy and practical interpretations of relationships to readers, which is the major concern in the applied realm of HRD. The data analyses were performed using DSTAT (Version 1; Johnson, 1989, 1991), a statistical software program for meta-analysis, which is based on the Hedges-Olkin (1985) approach in calculating effect sizes.

Effect Size Calculation

In this study, the primary effect size estimator was the correlation coefficient (ESr = *r*, the individual correlation coefficient). However, there is a bias in *r* values, which underestimates the population effect size, especially for studies with small samples and for *r* values close to 0.60 (Fisher, 1932; Johnson & Eagly, 2000). The sampling distribution of a sample correlation coefficient thus tends to be skewed further from zero,

as the population correlation becomes large. This fact complicates the comparison and combination of *r*'s across studies in meta-analysis. Thus, researchers recommend that Fishere's *r* to *z* transformation be used in order to minimize this potential bias (Resenthal, 1986, 2001; Wolfe, 1986). For this reason, ESr was transformed into a normally distributed ESZr in this study. The formula used in the transformation is as follows:

$$ESZr = \tfrac{1}{2} \log_e [(1 + ESr)/(1 - ESr)]$$

Where *r* is the correlation coefficient and $\log_e$ is the natural logarithm.

The transformed values were calculated using this equation and Zr transformed correlation were eventually transformed back into standard correlational form for ease of interpretation, which was done using the inverse of the Zr transformation (Hedges & Olkin, 1985):

$$r = [e^{2ESZr} - 1]/[e^{2ESZr} + 1]$$

Where r is the individual correlation, ESZr is the corresponding individual Zr transformed correlation, and e is the base of the natural logarithm, which is approximately 2.718.

Once statistical information was extracted from the individual studies and correlational effect sizes were computed, a weighted mean effect size was further calculated by averaging the individual Zr transformed effect sizes. In addition, each correlation was weighted by the number of subjects in that particular study with greater weight given to larger sample sizes. This procedure was done to capitalize on the most reliably estimated study outcomes, generally those with the largest sample sizes (Johnson, 1989; Snedecor & Cochran, 1980). The weighted mean Zr is obtained as follows from a correlation coefficient:

Weighted mean $Zr = \Sigma W_j Zr_j / \Sigma W_j$

As a test for significance, a 95% confidence interval (CI) was drawn around the calculated weighted mean effect size. If the CI includes the value of zero, the mean value indicates no difference, and it may be concluded that across all studies, there is no relationship between the independent and dependent variables.

The homogeneity of the effect sizes was tested simultaneously to determine whether the studies estimate a single effect size in the population of interest. If the effect sizes are heterogeneous, the weighted mean effect size does not adequately describe the study outcomes in the literature, and further work is required. For example, an analyst found the overall effect size of .54 between team diversity and performance. If the studies were estimating the same population, one would expect the distribution of their effect sizes to be no greater than that found by random error. The test of homogeneity is important in this sense that if the hypothesis that each study measures the same population is rejected, then the studies are too diverse to be legitimately pooled. Therefore, studies cannot be combined as they represent the different populations rather than one parameter.

Several remedies can be applied to cases where effect sizes are statistically heterogeneous. First, the effect sizes can be reexamined to detect extreme outliers that result in a significant deviation from homogeneity. Extreme outliers can be dropped from analyses as long as there is a theoretically sound rationale to do so. One can also reevaluate the theoretical framework in an attempt to uncover reasons behind the inconsistency among the studies. Finally, model testing can be conducted to explain heterogeneous effect sizes based on subgroup analyses (Hedges & Olkin, 1985, Hunter &

Shmdit, 1990). This study employed both outlier analysis and categorical model testing to examine the heterogeneity of the effect sizes.

Outlier Diagnosis

As in any studies in the social and behavioral sciences, the presence of outliers is prevalent in meta-analysis because they include "studies of imperfect methodological quality" (Schmidt, Law, Hunter, Rothstein, Peralman, & Mcdaneil, 1993, p. 10). An outlier in meta-analysis is a primary study effect size that does not seem to be consistent with the patterns of other study effect sizes. Extreme effect sizes are typically unrepresentative of the results of the research and possibly even spurious. Hedges (1987), for example, found that the removal of up to 20% of the outliers in a group of heterogeneous effect sizes generally resulted in a high degree of homogeneity in several meta-analyses on psychological topics. He argues that studies yielding effect sizes identified as outliers can then be re-examined to determine if they appear to differ methodologically from the remaining studies.

In this study, an outliner diagnosis was conducted in order to determine whether extremely abnormal data inherently affected the heterogeneity of the results prior to analyzing effect sizes' homogeneity using a categorical model testing. The outlier diagnosis procedure was done by identifying outliers among the effect sizes and sequentially removing those that reduced the homogeneity statistic by the largest amount (Hedges & Olkin, 1985). DSTAT was used to identify and delete outliers from subsequent analyses only if the percentage of correlations dropped would not exceed 10% of all the correlations in the sample (Dreu & Weingart, 2003). Once outliers were

identified, these data were carefully examined to see if these were due to human errors, such as misrecording or computational errors.

Categorical Model Testing

In the absence of homogeneity, attempts were made to explain variability among the effect sizes by analyzing study characteristics and conceptually-based moderators (A priori models). To determine the relation between the moderator variables and the magnitude of the effect sizes, categorical models for the four moderators, task complexity, team type, team setting, team size, were tested as suggested by Hedges and Olkin (1985).

Categorical models, analogous to an analysis of variance (ANOVA), can show that heterogeneous effect sizes are homogeneous within the subgroups established by dividing studies into classes based on moderators. Category models can further identify that the effect sizes differ in magnitude between the subgroups and the relevant moderator accounts for the systematic variability between them. In this study, following the Hedges and Olkin's approach, categorical models provide a between-classes effect, which is analogous to a main effect in ANOVA, and a test of the homogeneity of the effect sizes within each class. More specifically, the Hedges and Olkin's approach estimates the between-classes effect by Q_B, which has an approximate chi-square distribution with $p - 1$ degrees of freedom (p = the number of classes). The homogeneity of the effect sizes within each class i is estimated by Q_{wi}, which has an approximate chi-square distribution with $m - 1$ degrees of freedom (m = the number of effect sizes in the class). A significant Q_w indicates evidence that variability exists in the effect sizes within the class and thus homogeneity of the effect sizes is not achieved. Therefore, the mean

effect size provides a poor description of the typical effect size within each class and the results of moderator tests cannot be interpreted confidently.

CHAPTER 4

RESULTS

Chapter Overview

The first part of this chapter provides the results of the literature search and a description of the studies contained in the study database. The second part discusses the results of the meta-analyses with respect to the main effects of team diversity on team outcomes. The final part presents the analyses of the four moderators.

Results of the Literature Search

Study Database

The initial computerized literature review located over 500 abstracts of academic publications related to team diversity that were completed between January 1980 and December 2003. A manual search of the relevant journals was conducted and resulted in the addition of 37 articles to the eligible study pool. A total of 117 meta-analytic eligible articles were finally located by both computerized and manual searches. Full copies of 117 articles were then obtained and read in detail to determine whether they met the criteria for inclusion in this study. After the careful review of the 117 articles for study eligibility, 62 articles were dropped, as they did not meet the study inclusion criteria as discussed in Chapter 3. In total, 55 studies were included in this study and the included studies encompassed a wide variety of peer-reviewed journals, which provided 163 correlations between team diversity and team outcomes.

Descriptions of the Studies. Table 2 summarizes the publication sources and the studies included in the current study. The final 55 studies were from 15 peer-reviewed academic/professional journals and included 163 effect size correlations. Academy of Management Journal and Administrative Science Quarterly were the two most common journal sources, yielding a combined total of 58 effect size correlations. The least number of effect sizes were found in Human Resources and Decision Sciences.

Table 2

Publication Sources of the Studies Included in the Meta-analysis

Publication	# Studies	# Effect Sizes
Academy of Management Journal	14	31
Academy of Management: Learning and Education	1	4
Administrative Science Quarterly	8	27
Decision Sciences	1	1
Group and Organization Studies/Management	3	18
Human Relations	1	1
International Journal of Conflict Management	2	10
Journal of Applied Psychology	5	13
Journal of Management	5	9
Journal of Organizational Behavior	2	4
Organizational Behavior & Human Decision Processes	1	4
Organization Science	1	5
Personnel Psychology	4	9
Small Group Research	4	17
Strategic Management Journal	3	10
Total	55	163

Main Effects of Team Diversity on Team Outcomes

Research Objective 1: Measure the overall relationships between team diversity and team outcomes

The first objective of this study was to assess the overall impact of team diversity on team outcomes. In doing so, first, four relationships between team diversity and team performance were investigated: 1) job-related diversity and the quality of performance; 2) job-related diversity and the quantity of performance; 3) bio-demographic diversity and the quality of performance; and 4) bio-demographic diversity and the quantity of performance. Next, two relationships between team diversity and social integration were examined: 1) job-related diversity and social integration and 2) bio-demographic diversity and social integration.

Research Questions 1, 2, 3, and 4 explored the nature of these relationships between team diversity and team outcomes. The results are reported for each research question in the ensuing section

Research Question 1: What is the relationship between job-related diversity and team performance?

A total of 55 correlations from 25 studies were initially extracted to examine the relationships between job-related diversity and the two categories of team performance. Fisher's *r* to *z* transformed correlations are shown in Appendix D. Table 3 presents the analyses of the overall effect sizes between job-related diversity and both the quality and quality of team performance.

Table 3

Effect Sizes for the Effect of Job-related Diversity (JD) on Quality and Quantity of Team Performance

JD and Team Performance	*k*	*N*	ρ	Q_W	95% CI
JD- Quality	24	1151	.20*	137.35*	.15 ~ .21
JD-Quantity	28	1389	.15*	74.75*	.11 ~ .16

Note. k = number of effect sizes; N = total number of observations; ρ = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.
* $p < .05$.

The Effect of Job-related Diversity on the Quality of Team Performance. Twenty-five correlations from 14 studies were initially identified to examine the relationship between job-related diversity and the quality of team performance. In the first analysis, Cohen (1996)'s study was identified as the largest outlier. Therefore, it was excluded from subsequent analyses. Excluding Cohen's study, however, did not achieve homogeneity of effect sizes, as the tests for homogeneity were significant, $Q_W(23) = 137.35$, $p < .0001$. Therefore, additional moderator analyses were conducted, which will be presented later in the last part of this chapter.

While four studies found negative correlations, the average effect size correlation between job-related diversity and the quality of team performance was positive ($\rho = .20$), and the confidence interval did not include zero value (CI = .15 ~ .21). Overall, job-related diversity was positively related to the quality of team performance.

The Effect of Job-related Diversity on the Quantity of Team Performance. A total of 30 correlations were initially identified to examine the relationship between job-related diversity and the quantity of performance. Among them, two studies, Wiersema (1993), and Acona (1992), were identified as the largest outliers and thus excluded from

subsequent analyses leaving a total of 28 correlations included in the final analysis. Yet, excluding the two studies did not achieve homogeneity of effect sizes, as the test for homogeneity was significant, Q_W (27) = 74.75, $p < .0001$, indicating the presence of potential moderators (see Table 3).

While three studies found negative correlations, the average effect size correlation between job-related diversity and the quantity of team performance was positive (ρ = .15), and the confidence interval did not include zero value (CI = .11 ~ .16). Therefore, there was an overall positive relationship between job-related diversity and the quantity of team performance.

Research Question 2: What is the relationship between bio-demographic diversity and team performance?

A total of 34 correlations were identified from 16 studies in order to examine the impact of bio-demographic diversity on the two categories of team performance (see Appendix E). Table 4 summarizes the analyses of the overall effect sizes between bio-demographic diversity and both the quality and quality of team performance.

Table 4

Effect Sizes for the Effect of Bio-demographic Diversity (BD) on Quality and Quantity of Team Performance

BD and Team Performance	*k*	*N*	ρ	Q_W	95% CI
BD-Quality	21	716	.10*	21.39	.05 ~ .13
BD-Quantity	11	2348	.05*	16.61	.03 ~ .07

Note. k = number of effect sizes; N = total number of observations; ρ = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.
* $p < .05$.

The Effect of Bio-demographic Diversity on the Quality of Team Performance. A total of 22 correlations were initially identified in order to examine the relationship between bio-demographic diversity and the quality of team performance. In the first analysis, Rodriguez (1998)'s study was identified as the largest outlier and thus excluded from subsequent analyses. In doing so, the variation among the studies was substantially reduced thereby meeting the assumption of homogeneity of effect sizes across the studies (Q_W (20) = 21.39, p = .37 > .05).

While two studies found negative correlations between bio-demographic diversity and the quality of team performance, the remainder of the studies found positive correlations. The average effect size correlation between bio-demographic diversity and the quality of performance was positive (ρ = .10) and the confidence interval did not include zero value (CI = .05 ~ .13). There was an overall positive relationship between bio-demographic diversity and the quality of team performance.

The Effect of Bio-demographic Diversity on the Quantity of Team Performance. To study the effect of bio-demographic diversity on the quantity of team performance, 12 correlations were initially identified. However, Pelled (1999)'s study was identified as the largest outlier and thus excluded from subsequent analyses, leaving a final analysis of 11 correlations. As a result, the variation across the studies was substantially reduced (Q_W (11) = 16.61, p = .12 > .05). The average effect size correlation between bio-demographic diversity and the quantity of performance was extremely small yet statistically significant (ρ = .05) and the confidence interval did not include zero value (CI = .03 ~ .07). Overall, there was a positive relationship between bio-demographic diversity and the quantity of team performance. However, it should be noted that the final

sample of 11 correlations is considered acceptable but low in meta-analysis; therefore, the result should be considered tentative (Cooper, 1989; Rosenthal, 1984; Wolf, 1986).

Research Questions 3 & 4: What is the relationship between job-related diversity/bio-demographic diversity and social Integration?

Both job-related and bio-demographic diversity were examined with respect to their effects on social integration as specified in Research Question 3 and 4. A total of 40 correlations from 15 studies were included in the analyses (see Appendix F). Table 5 summarizes the analyses of the overall effect sizes between the two types of team diversity and social integration.

Table 5

Effect Sizes for the Effects of Bio-demographic and Job-related Diversity on Social Integration

Team Diversity and Social Integration	*k*	*N*	ρ	Q_W	95% CI
BD-Social Integration	26	888	.02	57.07*	−.01 ~ .05
JD- Social Integration	14	629	.02	58.98*	−.02 ~ .06

Note. k = number of effect sizes; N = total number of observations; ρ = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.
* $p < .05$.

The Effects of Bio-demographic and Job-related Diversity on Social Integration. A total of 26 correlations were analyzed to estimate an effect size correlation between bio-demographic diversity and social integration. The mean effect size was extremely small (ρ = .02) and the confidence interval for the relationship contained zero value (CI = −.01 ~ .05). It is thus concluded that there was statistically no significant relationship

between bio-demographic diversity and social integration. Similarly, no statistically significant relationship was found between job-related diversity and social integration (ρ = .02, CI = –. 02 ~ .06) based on the analysis of 14 correlations.

These results should be interpreted with caution, as the tests for homogeneity of effect sizes were significant in both cases, $Q_W(25) = 57.07$, $p < .0001$ and $Q_W(13) = 58.98$, $p < .0001$. The severe heterogeneity of the effect sizes indicated that the correlations between team diversity and social integration varied widely across the studies and moderators of the relationships might exist. Therefore, additional moderator analyses were conducted and discussed in detail in the final part of this chapter

The Summary of Research Objective 1: Measure the overall relationships between team diversity and team outcomes

There were overall positive relationships between job-related diversity and both the quality and quantity of performance; however, the tests for homogeneity of effect sizes were significant in both cases, indicating the presence of potential moderators in the relationships. Positive relationships were also found between bio-demographic diversity and the two categories of team performance. Although the effect sizes for both relationships are small (.10 for quality and .05 for quantity), the tests for homogeneity were insignificant indicating that the studies estimated the same population parameters. No statistically significant relationship was found between the two types of diversity and social integration and the tests for homogeneity were significant, which necessitated moderator tests.

Research Objective 2: Assess the varying impacts of the two types of team diversity on team outcomes.

The second primary objective of the study was to examine which type of team diversity has more impact on team outcomes. Research Questions 5 and 6 speculated that differential effects of the two types of diversity on team outcomes might exist. The results are discussed for each research question in the next section.

Research Question 5: Does job-related diversity have a greater impact on team performance than bio-demographic diversity?

Table 6 summarizes the mean effect size correlations between team diversity and team performance, broken down by the two types of diversity. Although the mean effect size correlation between job-related diversity and the quality of team performance (ρ = .20) was stronger than the mean effect size correlation between bio-demographic diversity and the quality (ρ = .10), the mean difference was not statistically significant, $t(45) = .48$, $p = .63$. Therefore, varying impacts of the two types of team diversity on the quality of team performance were not detected in this study. However, job-related diversity had a significantly stronger relationship with the quantity of team performance than bio-demographic diversity, $t(39) = 2.10$, $p < .05$. As can be seen in Table 6, the positive relationship between job-related diversity and the quantity of team performance (ρ = .15) was stronger than the relationship between bio-demographic diversity and the quantity of team performance (ρ = .05).

Table 6

Effect Sizes Broken Down for the Types of Team Diversity and Team Outcomes

Type of Team Diversity	Team Outcomes	
	Quality	Quantity
Job-related Diversity	.20* (.15 ~ .21)	.15* (.11 ~ .21)
Bio-demographic Diversity	.10* (.05 ~ .13)	.05* (.03 ~ .07)

Note. 95% confidence intervals are given in parentheses.
* $p < .05$.

Research Question 6: Does bio-demographic diversity have a greater impact on social integration than job-related diversity?

Differential effects of team diversity on social integration were not detected. The mean effect sizes for both job-related and bio-demographic diversity were not statistically significant with the confidence intervals for the relationships containing zero value (see Table 7). As previously noted, the evidence against the differential effects of team diversity on social integration was largely circumspect, as there was considerable heterogeneity among the study effect sizes. Therefore, further tests were conducted in order to examine the potential effects of moderators on the relationships as detailed in the last part of this chapter.

Table 7

Effect Sizes Broken Down for the Types of Team Diversity and Social Integration

Type of Team Diversity	Social Integration
Job-related Diversity	.02 (–.02 ~ .06)
Bio-demographic Diversity	.02 (–.01 ~ .05)

Note. 95% confidence intervals are given in parentheses.

The Summary of Research Objective 2: Assess the varying impacts of the two types of team diversity on team outcomes.

Partial support was found for the premise that the magnitudes of the relationships between team diversity and team outcomes are dependent upon the types of team diversity. While job-related diversity had a stronger positive relationship with the quantity of performance than bio-demographic diversity, differential effects of the two types of team diversity on the quality of performance were not detected.

Differential effects of team diversity on social integration were not found to be significant. The results were, however, tentative as there was severe heterogeneity among the study effect sizes, indicating the potential impact of moderators on the relationships. Moderator analyses were thus conducted as detailed in the following section.

Moderator Analyses

Research Objective 3: Examine the effects of potential moderators on the relationships between team diversity and team outcomes in the absence of homogeneity of effect sizes.

The third objective of this study was to examine the potential influences of the four hypothesized, theoretically-based moderators on the relationships between team diversity and outcomes.

Two methods of identifying the presence of moderators were employed. First, a 95% confidence interval (CI), as a test for significance, was drawn around the calculated weighted mean effect size. When the CI is large and contains zero, it is likely that moderators exist and further tests are necessary. Second, a test for homogeneity of effect sizes was conducted across the studies that were reviewed. If there is a large amount of

heterogeneity in the effect sizes among the studies being reviewed, this might be explained by the fact that other variables are moderating the effect.

In order to investigate the impact of potential moderators, categorical model tests were conducted to explain variability among the effect sizes by analyzing the four conceptually-based moderators: 1) team type, 2) team size, 3) team setting, and 4) task complexity. The tests for homogeneity were conducted using the Q statistics in order to examine the role of the hypothesized moderators in the relationships. Specifically, the Q statistics allows for a significance test of overall study-level effect size variability and formal testing for the presence of hypothesized moderator variables. The presence of a predicted moderator is supported by a significant Q_B, which indicates a difference between the mean effect size estimates across the subgroups, and an insignificant Q_W, which suggests that all the studies within each subgroup estimate a common population effect size.

It should be noted that several moderator analyses could not be conducted due to a lack of information on the four moderators provided in the included studies. In particular, sufficient data were only available to study the moderating role of team size in the relationship between team diversity and social integration. Therefore, team type, team setting, and task complexity could not be analyzed with respect to their potential influences on the relationships between team diversity and social integration. Implications for the lack of studies investigating these moderators are fully in discussion section.

Research Question 7: Do any of the moderators explain the effect size heterogeneity?

Based upon the analyses of the main effects of team diversity on team outcomes, the possible presence of moderators was detected in the following four relationships: 1) job-related diversity and the quality of team performance, 2) job-related diversity and the quantity of team performance, 3) job-related diversity and social integration, and 4) bio-demographic diversity and social integration (see Table 8). The results are reported for each moderator analysis in the next section.

Table 8

Potential Presence of Moderators in the Relationships between Team Diversity and Team Outcomes

	Quality of Team Performance	Quantity of Team Performance	Social Integration
Job-related Diversity	X	X	X
Bio-demographic Diversity			X

Note. X indicates the possible presence of moderators

The Influences of the Four Moderators on the Relationships between Job-related Diversity and Both the Quality and Quantity of Team Performance. The tests for homogeneity of effect sizes were significant in the relationships between job-related diversity and both the quality and quantity of performance, indicating the possible presence of moderators. Therefore, further analyses were conducted with respect to the following four moderators: 1) task complexity, 2) team size, 3) team type, and 4) team setting.

It should be acknowledged that the moderator results of this study should be interpreted with caution, as there was low statistical power among the studies used in some cases. Specifically, there were several subgroups analyzed that had a small number

of correlations, which in turn lowered the power to detect moderating effects. The issue of low statistical power of meta-analysis has been recently reviewed by several researchers (Cohen, 1992; Sackett, in press). They advise readers not to draw strong conclusions from a small meta-analysis sample even though there seems to be no definitive rule for defining "small". Moderator tests involving a small number of correlations in subgroups should be thus considered tentative and deserve further research to be conclusive.

Task Complexity. The results of the task type moderator analysis indicated that the levels of task complexity moderated the relationship between job-related diversity and quality with a significant Q_B (1) = 13.21, $p = < .05$. Consistent with the findings in the literature, a stronger positive correlation of .24 was found in teams working on highly complex tasks than teams working on less complex tasks (see Table 9).

Table 9

The Moderating Effect of Task Complexity on the Relationship between Job-related Diversity and the Quality of Team Performance.

Task Complexity	Job-related Diversity – Quality of Team Performance			
	k	ρ	Q_W	95% CI
Highly Complex	11	.24	62.06*	.21 ~ .27
Less Complex	5	.09	1.82	.05 ~ .16

Note. k = number of effect sizes; ρ = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.
* $p < .05$.

Task complexity also had a moderating impact on the relationship between job-related diversity and the quantity of team performance with a significant Q_B (1) = 12.26, $p = < .05$. Table 10 presents that the positive relationship between job-related diversity

and the quantity of team performance (ρ = .22) was stronger for teams working on highly complex tasks than team working on less complex task (ρ = .09).

Table 10

The Moderating Effect of Task Complexity as a Moderator on the Relationship between Job-related Diversity and the Quantity of Team Performance.

Task Complexity	Job-related Diversity -- Quantity of Team Performance			
	k	*ρ*	Q_W	95% CI
Highly Complex	8	.22	6.79	.17 ~ .27
Less Complex	8	.09	16.43	.03 ~ .14

Note. *k* = number of effect sizes; *ρ* = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.

Team size. Team size moderated the relationship between job-related diversity and the quality of team performance with a significant Q_B (1) = 5.18, p = < .05. The positive relationship between job-related diversity and quality was stronger for large teams (ρ = .20) than small teams (ρ = .08) as presented in Table 12.

Table 11

The Moderating Effect of Team Size on the Relationship between Job-related Diversity and the Quality of Team Performance.

Team Size	Job-related Diversity -- Quality of Team Performance			
	k	*ρ*	Q_W	95% CI
Large	15	.20	117.16*	.17 ~ .23
Small	4	.08	1.94	.01 ~ .17

Note. *k* = number of effect sizes; *ρ* = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.
* $p < .05$.

Team size was also found to be a moderator in the relationship between job-related diversity and the quantity of team performance with a significant Q_B (1) = 5.97, p = < .05. As shown in Table 12, that the positive correlation between job-related diversity and the quantity of team performance was stronger for small teams (ρ = .18) than large teams (ρ = .09). However, these results should be interpreted with caution, as homogeneity of effect sizes within the subgroups was not met with the significant Q_W statistics for both large and small team subgroups.

Table 12

The Moderating Effect of Team Size on the Relationship between Job-related Diversity and the Quantity of Team Performance.

Team Size	Job-related Diversity -- Quantity of Team Performance			
	k	ρ	Q_W	95% CI
Large	21	.09	62.07*	.06 ~ .12
Small	8	.18	21.15*	.08 ~ .24

Note. k = number of effect sizes; ρ = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.
* $p < .05$.

Team type. Team type had a moderating impact on the relationship between job-related diversity and the quality of team performance with a significant Q_B (1) = 14.76, p = < .001. Table 13 shows that the positive correlation between job-related diversity and the quality of team performance was stronger for work teams (ρ = .32) than management/project teams (ρ = .18). However, these results are not definitive, as homogeneity of effect sizes within the subgroups was not achieved with the significant Q_W statistics for both management/project team and work team subgroups.

Table 13

The Moderating Effect of Team Type on the Relationship between Job-related Diversity and the Quality of Team Performance.

Team Type	Job-related Diversity -- Quality of Team Performance			
	k	ρ	Q_W	95% CI
Management & Project Teams	21	.18	128.22*	.15 ~ .21
Work Teams	5	.32	64.17*	.26 ~ .38

Note. k = number of effect sizes; ρ = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.

Similarly, the moderating role of team type was found in the relationship between job-related diversity and the quantity of performance with a significant $Q_B(1) = 7.89$, $p = < .01$. As shown in Table 14, the positive correlation between job-related diversity and the quantity of performance was stronger for work teams ($\rho = .20$) than management/project teams ($\rho = .11$).

Table 14

The Moderating Effect of Team Type on the Relationship between Job-related Diversity and the Quantity of Team Performance

Team Type	Job-related Diversity -- Quantity of Team Performance			
	k	ρ	Q_W	95% CI
Management & Project Teams	28	.11	88.93*	.09 ~ .14
Work Teams	6	.20	8.61	.11 ~ .24

Note. k = number of effect sizes; ρ = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.
* $p < .05$.

Team setting. Team setting did not influence the relationship between job-related diversity and the quality of performance with an insignificant Q_B (1) = 1.7, p = .19 > .05. The results should, however, be interpreted with caution, as there were only two studies conducted in laboratory settings as compared with 24 studies in organizational settings (see Table 15). Furthermore, the relationship between job-related diversity and the quantity of team performance could not be analyzed, as no study was conducted in laboratory settings. Implications for the lack of studies in laboratory settings are fully examined in discussion section.

Table 15

The Moderating Effect of Team Setting on the Relationship between Job-related Diversity and the Quality of Team Performance.

Team Setting	*Job-related Diversity -- Quality of Team Performance*			
	k	ρ	Q_W	95% CI
Organizations	24	.20	204.54*	.18 ~ .23
Laboratory	2	.12	.91	.00 ~ .24

Note. k = number of effect sizes; ρ = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.
* $p < .05$.

The Impact of Team Size on the Relationships between Team Diversity and Social Integration. Substantial heterogeneity of the effect sizes was also found in the relationships between the two types of team diversity and social integration indicating the potential influence of the moderators. However, as previously noted, only the team size moderator could be analyzed due to a severe lack of information on the other moderators provided in the included studies.

Team size. Team size, dichotomized as small and large, had no impact on the relationship between bio-demographic diversity and social integration with an

insignificant Q_B (1) = 2.101, p = .14 >. 05. In contrast, team size played a moderating role in the relationship between job-related diversity and social integration with a significant Q_B (1) = 17.354, p = <. 001. Yet, these results are tentative, as homogeneity of effect sizes within the subgroups was not achieved for both bio-demographic and job-related diversity subgroups (see Tables 16 and 17).

Table 16

The Moderating Effect of Team Size on the Relationship between Bio-demographic Diversity and Social Integration.

Team Size	Bio-demographic Diversity – Social Integration			
	k	ρ	Q_W	95% CI
Large	10	.06	17.15*	.01 ~ .10
Small	17	.01	31.79*	–.04 ~ .05

Note. k = number of effect sizes; ρ = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.
* $p < .05$.

Table 17

The Moderating Effect of Team Size on the Relationship between Job-related Diversity and Social Integration.

Team Size	Job-related Diversity – Social Integration			
	k	ρ	Q_W	95% CI
Large	10	.07	22.18*	.02 ~ .12
Small	9	–.11	32.42*	–.18 ~ –.04

Note. k = number of effect sizes; ρ = mean effect size correlation corrected for bias due to sample size; Q_W = within- class homogeneity; 95%CI = lower and upper boundaries of the 95% confidence interval.
* $p < .05$.

The Summary of Research Objective 3: Examine the effects of potential moderators on the relationships between team diversity and team outcomes in the absence of homogeneity of effect sizes.

Moderator tests were conducted with respect to the four hypothesized moderators, as the tests for homogeneity of effect sizes were significant in the relationships between job-related diversity and the both quality and quantity of team performance. The results indicated that task complexity, team size, and team type moderated the relationships between job-related diversity and the both quality and quantity of team performance. However, no moderating effect of team setting on the relationships was found.

Severe heterogeneity among the study effect sizes was also found in the relationships between the two types of team diversity and social integration. However, this study was able to examine only the team size moderator due to insufficient information on the other three moderators. While team size played a moderating role in the relationship between job-related diversity and social integration, it did not influence the relationship between bio-demographic diversity and social integration. The results were, however, inconclusive, as there was substantial effect size heterogeneity within the subgroup analyses.

CHAPTER 5

DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

Chapter Overview

This study synthesized the empirical results from 55 studies and estimated the overall effect sizes between team diversity and team outcomes. Furthermore, moderator variables were identified and tested to assess their potential influences on the relationships. In doing so, the team literature between 1980 and 2003 was examined and a total of 163 correlations were meta-analyzed to achieve the following three research objectives:

1) Measure the overall relationships between team diversity and team outcomes
2) Assess the varying impacts of the two types of team diversity on team outcomes.
3) Examine the effects of potential moderators on the relationships between team diversity and team outcomes in the absence of homogeneity of effect sizes.

The results indicated that team diversity was positively related to team performance although it was not related to social integration. Further analyses suggest that there were varying effects of team diversity on team outcomes, and partial support for the effects for the hypothesized moderators was also found. Discussion, conclusions, and implications drawn from these results are discussed in detail in this chapter.

Discussion and Conclusions

Discussion and conclusions of the findings from this study are summarized based on the three primary research objectives as presented in the previous chapters.

Research Objective 1: Measure the overall relationships between team diversity and team outcomes.

This study quantified the effects of job-related and bio-demographic diversity on the two categories of team outcomes, team performance and social integration.

Analyses of team performance were broken down into four relationships: 1) job-related diversity and the quality of performance; 2) job-related diversity and the quantity of performance; 3) bio-demographic diversity and the quality of performance; and 4) bio-demographic diversity and the quantity of performance. Based on a total of 84 correlations extracted from 41 studies, the results of the series of meta-analysis indicated that team diversity, both job-related and bio-demographic attributes, had positive relationships with team performance. Although the magnitudes of effect size correlations ranged from .20 to .05, the average effect size correlations found in all the four relationships were significant and positive. Overall, team diversity was found to be significantly related to both the quality and quantity of team performance.

Analyses of social integration were also broken down into two relationships: 1) job-related diversity and social integration and 2) bio-demographic diversity and social integration. The results based on the analyses of 40 correlations from 15 studies indicated neither type of diversity had a relationship with social integration. A possible explanation for the lack of relationships might be the moderating influence of time on the

relationships between the two types of diversity and social integration. Specifically, a team's longevity may influence the relationships between team diversity and social integration. It is conceivable that member satisfaction and cohesion improve over the duration of the teamwork. For example, bio-demographic dissimilarity may result in fewer interactions among team members early in the relationship, but may increase the frequency of interactions and the degree of social integration among members over time. The scope and length of member meeting/interaction may also influence the level of social integration in teams.

In their longitudinal laboratory study of team decision-making, Watson and colleagues (1993) found that team diversity had a different impact on team processes and performance at different points in time. Harrison, Price, and Bell (1998) similarly observed that the length of time team members worked together decreased the negative effects of team diversity on social integration, as the amount of interaction increased. Research seems to posit that the negative affective outcomes associated with team diversity decrease over time, as members become accustomed to each other and have a greater appreciation for the differences among them. However, as the studies used in this study are mostly survey or observational studies and rarely reported the tenure of teams, it was unable to control for this factor.

Another possible explanation is the potential impact of the organizational context on social integration in teams. Attributes of an organization's environment, such as culture, climate, or managerial support, can influence member interactions and thus social integration. For example, team training is frequently used in organizations as a means to increasing the efficacy of teamwork (Modrick, 1986; Moreland & Myaskovsky, 2000;

Paris, Salas, & Cannon-Bowers, 2000). Subsequently, social integration in teams is more likely to be efficacious when employees attending team training perceive high levels of supervisory support on their involvement in teams. Research suggests that perceived managerial support for development activity is associated with higher levels of voluntary learning and development activity on the part of employees (Maurer & Tarulli, 1994; Noe & Wilk, 1993). In sum, organizational cultures or managerial support to promote diversity in teams may result in fewer problems in team development and thus mitigate the potentially negative effects of team diversity.

Research Objective 2: Assess varying impacts of the two types of team diversity on team outcomes.

The second primary objective of this study was to examine potentially differential effects of the two types of team diversity on each team outcome as stated in Research Questions 5 and 6. Research Question 5 specifically asks whether job-related diversity has a greater impact on team performance than bio-demographic diversity. The main effect size analyses demonstrated that there were differential effects of team diversity on the quantity of performance. Job-related diversity with a mean effect size of .15 had a statistically stronger positive relationship with the quantity of performance than bio-demographic diversity with a mean effect size of .05. However, differential effects of the two types of team diversity on the quality of performance were not detected in the current study.

These findings are different from two previous meta-analyses that did not find any varying effects of team diversity on team performance (Bowers, Pharmer, & Salas, 2000;

Weber & Donahue, 2001). In comparing the current meta-analysis to these other studies, it is important to note that several methodological differences exist among them. First, quite a few studies that were unavailable for the other two were added in this study. Next, Bowers and associates (2000) only studied three attributes of team diversity, gender, ability, and personality, without any distinction between job-related and demographic diversity. Furthermore, their team outcome variables were less delineated than the team outcome variables used in the current study. The researchers included quality, quantity, and accuracy in measuring team performance without distinctions among them. Similarly, Weber and Donahue (2001) combined financial outcomes, quantity, and quality into one broad team performance. In the current study, team performance was sub-divided into two categories, the quality of performance assessing the subjective and narrative aspect of team performance, and the quantity of performance measuring the objective nature of team performance. Combining different categories of team performance into one broad dimension as done in the two previous meta-analytic studies can potentially confound the ensuing results, as such aggregation assumes that these categories are equivalent with similar (if not equal) distributions. This assumption was not made in the current study. Therefore, these methodological differences should be clearly recognized when comparing the findings of the three studies.

Although the magnitudes of the effect sizes vary from .05 to .20, differential effects of the two types of diversity on the quantity of team performance were found. In this manner, the results derived from this meta-analysis may be of particular interest to Human Resources (HR) professionals who frequently put diverse individuals into teams. In creating teams of heterogeneous members, HR practitioners should understand these

differential effects of team diversity on performance and further integrate employees with varying attributes to maximize positive team performance. For instance, if a task requires considerable time and resources to be accomplished, it would be then ideal to create a high performing team with heterogeneous members in terms of job-related diversity but less heterogeneous regarding bio-demographic attributes. Treating team diversity as a generic concept is likely to yield ineffective team outcomes due to inherent relational and personal conflict among team members.

Research Question 6 asks whether bio-demographic diversity has a greater impact on social integration than job-related diversity. The main effect size analyses demonstrated that there were no differential effects of team diversity on social integration. This lack of differential effects may be caused by other organizational contextual factors affecting the relationships. As discussed earlier, the possible moderating effect of team longevity or organizational culture, for example, weakens any relationship between team diversity and social integration. Another possible explanation for the lack of the moderating role may be that the relationships between team diversity and social integration are non-linear in nature. The implicit assumption of linearity was made in this study with respect to the relationships between team diversity and social integration. However, there may be a curvilinear relationship between the two. That is, social integration can be more efficacious if a certain level of diversity exists among team members as opposed to entirely homogeneous members. It is possible that either too high or too low levels of team diversity can have a negative impact on social integration. For example, if members are all alike regarding their expertise and industry experience, there may be little idiosyncratic information shared and stimulating interactions among

members. In contrast, extremely diverse members on functional expertise may complicate interactions due to the lack of understanding of each other's specialties. The difficult question remains as to where one should draw the line between an optimal level of team diversity and excessive or low level of team diversity. This potential curvilinear relationship between the level of diversity and social integration needs to be more fully addressed in future research.

Objective 3: Examine the effects of potential moderators on the relationship between team diversity and team outcomes in the absence of homogeneity of effect sizes

The third objective of the study was to examine the influences of the four moderators on the relationships between team diversity and team outcomes when results were statistically heterogeneous.

However, it should be noted that several moderator analyses could not be conducted due to a lack of information provided in the included studies. Insufficient data did not allow this study to conduct a full set of moderator analyses as initially planned. Specifically, the potential effects of the following three moderators, task complexity, team type, and team setting, on the relationships between team diversity and social integration could not be examined. More research should be conducted to assess these moderators in order to fully investigate their potential effects on teamwork. The findings and implications of the moderator test analyses are discussed in detail in the following section.

Task complexity. The level of task complexity was found to be a significant moderator in the relationships between job-related diversity and both the quality and

quantity of performance. Teams working on highly complex tasks had stronger positive relationships with both categories of team performance than teams working on less complex tasks. This finding supports much of the research on team composition. Complex and ill-defined tasks require team members to seek out all available sources from multiple expertise and skills in a team. Consequently, in dealing with highly complex tasks, organizations could benefit from intentionally creating teams with heterogeneous members of varying expertise, skills, and education.

This finding, however, may be limited in its ability to be generalized, as several studies could not be included in the moderator analysis due to a lack of information regarding task complexity. In-depth task descriptions were the most frequently missing information in the included studies. For instance, there was little information on the nature of the product or service being developed by the team or detailed functions of the team. Therefore, there is still need for continuously examining the moderating role of task complexity in the relationship between team diversity and team performance.

Team type. Team type was found to moderate the relationships between job-related diversity and both the quality and quantity of team performance. However, the relationships were stronger for work teams than management/project teams, contrary to the expectation that the moderating impact of team type would be stronger for upper-level teams than lower-level teams. One possible explanation may be the inclusion of studies whose survey-based research designs are inherently prone to measurement error. For example, the number of ideas/outputs generated was used to measure the outcome variable for the quantity of team performance. However, the desired outcomes of management and project teams are frequently related to qualitative goals, such as

formulating business strategy or enhancing the quality of services and thus difficult to measure quantitatively. In contrast, outcomes of work teams, such as the volume of sales or the quantity of physical products, are more easily quantifiable and objectively evaluated than outcomes of upper-level teams. Yet, the majority of the studies included in this analysis used individuals members' perceptions of how many outputs were produced rather than the actual number of outcomes and this in turn may have increased the degree of measurement error.

Additionally, there was substantial discrepancy regarding the number of correlations included in each subgroup analysis. For example, in the quality category, only five effect sizes were analyzed in the work team subgroup while 21 effect sizes were included in the management and project team sub group analysis. Similarly, in investigating the moderating role of team type in the relationship between job-related diversity and quantity, six effect sizes were examined in the work team subgroup as compared with 28 effect sizes included in the management/project team subgroup. This skewed data in the subgroups may have artificially inflated the moderating effect of team type rather than detecting a true impact of the moderator in the relationship. A low number of studies with spurious findings may also have led to a wide range of effect sizes within the subgroups and a false detection of the variable as a moderator. The results of the team type moderator are not thus strongly conclusive and continued research on the impact of team type on the relationship between team diversity and team performance is necessary.

Team size. Overall, the moderator tests regarding the impact of team size were marked with inconsistent results. For example, team size moderated the relationships

between job-related diversity and both the quality and quantity of team performance. Consistent with the expectation, the positive relationship between job-related diversity and the quantity of performance was stronger for small teams than large teams. In contrast, the positive relationship between job-related diversity and quality was stronger for large teams than small teams. However, inferences cannot be drawn from these results, as there was substantial heterogeneity within the subgroups indicating that the calculated mean effect size correlations within each subgroup provide poor descriptions of the population parameters. More research is thus needed to examine the exact nature of the team size moderator in the relationships between team diversity and team performance.

Team size had no effect on the relationship between bio-demographic diversity and social integration, while it had a moderating effect on the relationship between job-related diversity and social integration. Although the moderating effect of tem size was found on relationship between job-related diversity and social integration, this result was rather inconclusive, as there was substantial effect size heterogeneity within the subgroup analyses. These inconsistent findings are even more perplexing, as a clear negative relationship was found between team size and social integration in the later analysis (see Appendix G for the additional analysis). One possible reason for the inconsistent findings may be due to an attenuation of the correlation from the artificial dichotomization of team size in the moderator analysis. For the categorical model testing for the team size moderator, studies were artificially dichotomized into two categories, either large or small, although the true measurement level of team size is considered to be continuous. In contrast, correlation coefficients, continuous level data, were analyzed in examining the

relationship between team size and social integration in the later analysis. In doing so, a negative effect of team size on social integration was found. It is thus conceivable that the moderating impact of team type was present in the relationship but the categorical model testing based on the dichotomized team size may have failed to detect such effect.

If a negative association between team size and social integration found in the additional analysis can be verified in future studies, it then holds several implications for the improved use of teams in organizations. Teams tend to be well integrated when they are relatively small in size. As the potential number of interpersonal relationships among team members increase in large teams, subgroups are more likely to form and the potential for conflict is correspondingly greater (Shaw, 1981). It may be thus beneficial to subdivide a large task and assign portions of it to several small teams in order to minimize the potential for process losses and negative affective outcomes associated with large teams. As compared to large teams, small teams may be also more efficient in minimizing social loafing or free rider behavior, which is often associated with dissatisfaction among team members. More studies should be conducted in order to generalize the implications from this finding to organizations.

Team setting. Team setting had no moderating effect on the relationship between job-related diversity and the quality of performance. However, there was a considerable lack of studies investigating this relationship in a laboratory setting; only two studies were conducted in laboratory settings. Furthermore, the potential impact of team setting on the relationship between team diversity and quantity could not be analyzed, as none of the included studies were conducted in laboratory settings. Therefore, it is conceivable that this severe imbalance may have lowered statistical power, thereby decreasing the

ability to detect a potential moderating effect of team setting on the relationship between team diversity and performance. Because of the low number of correlations involved in the moderator analysis, the results cannot be viewed with a strong degree of confidence. To this extent, the effect of team setting on the relation between job-related diversity and team performance should be revisited after a sufficient number of data are collected by studies on this area in the future.

Implications

Over the past two decades, researchers have often noted the conflicting nature of the relationship between team diversity on team outcomes. The current study endeavored to clarify some of the equivocal findings in the literature and provide additional information on the effects of team diversity on various outcomes of teamwork. In particular, the current study was the first attempt to meta-analytically validate the positive effects of team diversity on team performance by using Cox and Blake's three diversity outcomes. The findings of the current study empirically confirm Cox and Blake's widely cited competitive advantages of work force diversity and further transfer the advantages to team settings. Given the prevalent use of diverse teams in today's workplaces, both HRD researchers and practitioners may find the findings from this study particularly useful, as they provide the field with a much-needed empirical confirmation to apply the concept of value-in-diversity to teamwork.

Implications for Future Research

Future research regarding the potential moderating influence of time in teamwork will greatly enhance the current understanding of the relationships between team

diversity and team outcomes, in particular social integration in teams. As previously noted, teamwork is a dynamic process, in which the nature of interactions and relationships among diverse members change during the duration of a team project. The predicative role of team diversity on team outcomes seems to be especially dynamic in nature; for instance, bio-demographic diversity may result in less interaction early in the relationship, but may be beneficial later in the relationship as members are exposed to divergent perspectives and learn to capitalize on their varying skills and expertise. The current team literature, however, severely lacks studies investigating this changing nature of team interactions and associated outcomes. As McGrath (1986) pointed out, while many researchers profess to study team dynamics, they do so statically and in essence provide only a one-dimensional snapshot of teamwork. Therefore, longitudinal experimentation and observation of teamwork is much needed in order to uncover the dynamic relationships between team diversity and outcomes.

Another important line of research lies in exploring the potential curvilinear relationship between diversity and similarity. The current team research has a tendency to view member diversity and member similarity as mutually exclusive constructs (Ofori-Dankwa & Julian, 2000; Quinn, 1988). However, there has been increasing interest regarding the potential curvilinear relationship between member diversity and member similarity. Most notably, two paradigms of the curvilinear models of team diversity/similarity have been proposed: the inverted U model and the upright U model.

Early and Mosakowski (2000) have advocated the upright U model, arguing that given sufficient time and opportunity to work together, highly heterogeneous teams would be more effective than moderately heterogeneous teams. The researchers found

that over time highly diversified and heterogeneous teams developed a shared team culture, which in turn provided a common sense of community that facilitated team performance. Jetten, Spears, and Manstead (1998), in contrast, supported the inverted U taxonomy of team diversity/similarity, noting that a balance flown from a combination of member differences and similarities maximize positive organizational outcomes. Their empirical study of an ad hoc team and a naturally occurring team found that the combination of inter-group difference and similarity produced moderated distinctiveness, which significantly affected positive differentiation. However, exclusive emphasis on either member differences or similarities was not significantly related to positive differentiation. In spite of their theoretical discrepancies regarding the effect of team diversity/similarity, both models propose a curvilinear relationship between member diversity/similarity and team outcomes while discarding a simple liner relationship often portrayed in the team literature. Future exploration of curvilinear models of team diversity/similarity will possibly reveal more about the complex nature of the relationships between team diversity and team outcomes.

Another area of potential research would be measuring the impact of team diversity on firms' financial performance. While a significant amount of literature has assessed the beneficial effects of team diversity, little has been done to estimate and quantify teams' financial impact on firms' operations. Future investigation of the linkage between team performance and firm performance within the context of team diversity would offer a high degree of utility for both researchers and practitioners aiming to advance methods for improving upon HRD interventions.

Finally, there should be a refinement of the process model of team diversity, particularly with respect to moderators that may influence the relationships between team diversity and team outcomes. Although the conceptual framework presented in this study investigated only four moderating variables, it is likely that other important moderating variables exist. As discussed in the previous chapter, the frequency of interaction and supervisory support are two potential moderators that may influence the relationship between team diversity and social integration, and thus should be examined in future research. At the same time, it is clear that there is ample room for more empirical studies on the two types of team diversity as well as the moderators examined in this study. In spite of the prolific research done on the topic for the past two decades, when studies were categorized under each diversity attribute (e.g., age diversity and tenure diversity) and moderator, the number of studies that could be meta-analyzed were surprisingly sparse. This meta-analysis revealed that several categories of team diversity and moderator variables have a relatively small number of empirical studies. It is thus imperative that researchers continue examining the variables discussed in this study and further explore potential variables and paths to expand and refine team diversity models.

Implications for Practice

The results of this research demonstrate that the strategic use of diversity in establishing work teams can hold a significant value for organizations. Indeed, consistent with past theory (Cox & Blake, 1991), the positive outcomes associated with workforce diversity were shown to be present in teams with diverse employees. These findings are thus an attestation to organizations that team diversity engenders competitive advantages,

especially if they combine the right compositional attributes in creating teams. Consequently, understanding the potential compositional effects of team diversity on team outcomes can be useful in offering practitioners some fundamental ways of rethinking about relational structures and their implications in organizations. For instance, while bio-demographic diversity, such as race or gender, is not a good predicative measure of a team's performance, knowing the racial or gender composition of the team enables one to make some informed predictions about performance pressure and social integration within the team.

There are several viable approaches that HR professionals can employ to create an environment conducive for maximizing the efficacy of teamwork. For example, HR practitioners can positively influence teamwork by providing specific training aimed at helping individual members to recognize their similarities and bridge their differences (i.e., team building or interpersonal communication sessions). There is a long stream of research suggesting that effective organizations must have the ability to be both differentiating and integrative (Lawrence & Lorsch, 1967; Peters & Waterman, 1988). Specifically, by illuminating potential benefits of team diversity, team training can provide incentives for organizations to manage teams and capitalize on their strengths. At the same time, such training can also increase the awareness of potential problems associated with team diversity and provide strategies for coping with problems.

There should be ample caution in promoting member diversity in teams. Simply increasing the amount of diversity in teams is not an effective strategy, as many contextual factors can impede the effectiveness of heterogeneous teams. As teams are nested in multi-levels of organizations, HR practitioners should take these contextual

variables into account in facilitating team diversity. For example, as time and organizational support tend to mitigate the negative influence of team diversity on affective outcomes, ample time and resources should be provided to teams to develop team cohesiveness prior to assessing their performance. Additionally, HR professionals should be particularly careful when using any type of demographic characteristics as the basis for inclusion or exclusion of individuals into specific groups, as doing so may violate Title VII and other anti-discrimination laws. It is absolutely necessary for organizations to adhere to legal standards while establishing formal workgroups, and to some extent this may pose a limitation on determining group membership in spite of what combinations research finds to be the most optimal.

Team diversity is a dynamic and complex phenomenon and managing such diversity is a critical organizational concern, as labor pools become more heterogeneous and companies place more emphasis on teamwork to respond to market competitions. Yet, simply adding diversity into teams will not make them more effective. Rather, the success of teamwork is largely dependent upon the right composition of particular attributes, such as member expertise, education, age, and task complexity, as demonstrated in this study. Organizations thus need to understand how to integrate divergent talents and perspectives while overcoming the major sources of "process loss" often associated with team diversity. Consequently, a single theoretical lens portraying all types of diversity have one particular effect, either positive or negative, on team outcomes should be replaced with more theoretically-based, process-driven, contingent paradigms of team diversity.

Although the quality and effectiveness of teams are largely dependent upon members' unique characteristics and strengths, organizations should understand that a synergistic effect of individual characteristics on team performance can be achieved only through coordinating and integrating such diversity into one cohesive entity. The perspective shift from individual diversity attributes to compositional and relational structures at a team level is thus an important feature of teamwork analyses organizations should pursue. In doing so, the knowledge of various compositional effects of team diversity on team outcomes can help organizations determine how to align diverse teams with their strategic goals and ultimately enhance overall organizational performance. At the same time, such knowledge can also help organizations bring strategic unity into their teams in today's diverse workplaces. As Sheppard (1993) noted, "Variety is the spice of life in a group, so long as there is a basic core of similarity."

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APPENDIX A: A LIST OF STUDY VARIABLES AND STATISTICAL INFORMATION

Year	1st Author	Journal	Outcome	Sample Size	Team Size	Expertise	Org. Tenure	Education	Age	Gender	Race
1999	Simons	AMJ	Decision-making	57		0.070	0.180	-0.200	0.080	.	.
1998	Rodriguez	SGR	Satisfaction	11		.	.	.	-0.314	-0.467	0.000
1998	Rodriguez	SGR	Creativity/innovation	11		.	.	.	-0.570	0.041	-0.283
1998	Rodriguez	SGR	Decision-making	11		.	.	.	0.109	0.463	0.389
2001	Klein	JAP	Satisfaction	65		.	0.050	0.030	0.210	-0.140	.
2001	Klein	JAP	Creativity/innovation	65		.	0.350	0.050	0.160	-0.050	.
1994	Smith	ASQ	Number of outputs/ideas	53		0.165	.	0.225	.	.	.
1994	Smith	ASQ	Satisfaction	53	-0.433	-0.319	.	0.019	.	.	.
1996	Amason	AMJ	Team cohesion	45	-0.290						
2002	Colquitt	PP	Team cohesion	88		.	.	.	-0.100		
1989	Bantel	SMJ	Creativity/innovation	198		0.310	0.020	0.290	0.180	.	.
1993	Campion	PP	Satisfaction	77	0.070	0.150	.	.	.	.	.
1990	Eisenhardt	ASQ	Number of outputs/ideas	66		0.240	.	.	.	.	.
1999	Pelled	ASQ	Number of outputs/ideas	45		-0.130	0.360	.	0.090	-0.190	-0.020
2001	Keller	AMJ	Creativity/innovation	93		0.370	.	.	.	.	.
2001	Keller	AMJ	Time to complete a task	93		0.300	.	.	.	.	.
2001	Keller	AMJ	Team cohesion	93	-0.240	-0.150	.	.	.	.	.
2003	Randel	AMJ	Team cohesion	37	0.080	-0.110	.	.	-0.020		
2001	Carpenter	AMJ	Number of outputs/ideas	207		0.020	0.050	0.050	.	.	.
2001	Chatman	AMJ	Satisfaction	24	-0.170						
2001	Chatman	AMJ	Satisfaction	24		.	.	.		-0.180	
2001	Lovelace	AMJ	Creativity/innovation	43		-0.130	.	.	.	.	.
1994	Sutcliffe	AMJ	Decision-making	65		0.050	.	.	.	.	.
1999	Dooley	AMJ	Team cohesion	88	-0.140						
1997	Boeker	AMJ	Number of outputs/ideas	67		.	0.210	.	.	.	.
2003	Martins	GOM	Team cohesion	110	0.000	.	.	.	.	-0.040	-0.020
2003	Martins	GOM	Satisfaction	110	-0.040	.	.	.	.	0.020	0.100
2003	Martins	GOM	Team cohesion	30	-0.180	.	.	.	.	0.310	-0.250
2003	Martins	GOM	Satisfaction	30	-0.030	.	.	.	.	0.300	-0.200
2001	De Dreu	JOM	Satisfaction	27	-0.020						
1999	Jehn	ASQ	Number of outputs/ideas	92			.	0.200	.	-0.070	
1999	Jehn	ASQ	Team cohesion	92			.	0.160	.	0.090	
1999	Jehn	ASQ	Satisfaction	92			.	0.080	.	0.140	
1980	Dailey	DS	Team cohesion	45	-0.280						

Year	1st Author	Journal	Outcome	Sample Size	Team Size	Expertise	Org. Tenure	Education	Age	Gender	Race
1997	Baugh	GOM	Team cohesion	31	-0.180						
1997	Baugh	GOM	Satisfaction	31	-0.120						
1995	Harmon	OBHD	Number of outputs/ideas	44		.	.	.	.	0.140	.
1995	Harmon	OBHD	Problem-solving	44		.	.	.	.	-0.020	.
1995	Harmon	OBHD	Number of outputs/ideas	46		.	.	.	.	0.200	.
1995	Harmon	OBHD	Problem-solving	46		.	.	.	.	0.130	.
1994	Bantel	GOM	Creativity/innovation	79		0.210	.	0.030	.	.	.
1994	Bantel	GOM	Number of outputs/ideas	79		0.080	.	0.300	.	.	.
1998	LePine	JAP	Satisfaction	95	-0.270						
1998	Harrison	AMJ	Team cohesion	71	-0.120	.	.	.	-0.020	-0.180	0.120
1997	Barry	JAP	Team cohesion	61	-0.270						
1996	Campion	PP	Satisfaction	60	-0.130	0.310	.	.	.	.	.
1993	Bantel	PR	Creativity/innovation	168		0.370	.	0.330	.	.	.
1993	Bantel	PR	Number of outputs/ideas	168		0.030	.	0.040	.	.	.
2003	Orlitzky	AMLE	Problem-solving	37		0.000	.	.	.	0.090	.
2003	Orlitzky	AMLE	Decision-making	37		0.030	.	.	.	0.130	.
2001	Mortensen	IJCM	Team cohesion	24		.	.	.	.	.	0.460
2001	Mortensen	IJCM	Creativity/innovation	24		.	.	.	.	.	0.240
1999	Amason	IJCM	Number of outputs/ideas	44		.	.	.	.	.	.
2000	Tihanyi	JOM	Number of outputs/ideas	126		0.100	0.140	0.030	0.030	.	.
2001	Rentsch	JOB	Team cohesion	37	-0.310						
2000	Timmerman	SGR	Number of outputs/ideas	1082		.	.	.	0.030	.	0.100
2000	Timmerman	SGR	Number of outputs/ideas	871		.	.	.	0.040	.	0.020
2000	Vegt	JOM	Team cohesion	22	-0.100						
2000	Vegt	JOM	Satisfaction	22	-0.110						
1996	Cohen	HR	Creativity/innovation	120		0.560	.	.	.	.	.
2001	Miller	SGR	Satisfaction	42	0.130						
1997	Jehn	IJCM	Problem-solving	88		.	.	0.160	0.060	0.010	0.020
1997	Jehn	IJCM	Satisfaction	88		.	.	0.070	-0.020	0.070	0.050
1992	Lant	SMJ	Number of outputs/ideas	40		0.192	.	.	.	.	.
1992	Lant	SMJ	Number of ouputs/ideas	40		0.225					
2003	Schippers	JOB	Satisfaction	54	0.020						
2003	Schippers	JOB	Team cohesion	54	-0.181						
1995	Jehn	ASQ	Satisfaction	93	0.110						
1998	Barrick	JAP	Team cohesion	51	-0.070						
1986	Keller	AMJ	Team cohesion	30	-0.290						
2000	Barsade	ASQ	Satisfaction	20		0.290	.	.	.	.	.

Year	1st Author	Journal	Outcome	Sample Size	Team Size	Expertise	Org. Tenure	Education	Age	Gender	Race
2000	Barsade	ASQ	Number of outputs/ideas	36		0.400	.	.	.	.	.
1992	Ancona	OS	Creativity/innovation	47		-0.260	0.070	.	.	.	.
1992	Ancona	OS	Time to complete a task	47		-0.010	-0.270	.	.	.	.
1992	Ancona	OS	Satisfaction	47	-0.050						
1989	O'Reilly	ASQ	Team cohesion	20	-0.030	.	-0.180	.	0.010	.	.
1989	O'Reilly	ASQ	Satisfaction	20	0.151	.	-0.160	.	-0.120	.	.
1994	Keller	AMJ	Creativity/innovation	98		.	0.080	.	.	.	.
1994	Keller	AMJ	Time to complete a task	98		.	0.040	.	.	.	.
2003	Bunderson	JAP	Number of outputs/ideas	44		-0.020	0.170	.	.	.	.
2002	O'Connell	GOM	Team cohesion	102	-0.130						
2003	Bayazit	SGR	Decision-making	28		.	.	.	0.010	0.090	-0.030
2000	Langfred	JOB	Team cohesion	61	-0.060						
2000	Langfred	JOB	Team cohesion	67	-0.140						
1993	Wiersema	AMJ	Number of outputs/ideas	40			-0.250	0.150	0.070		
1999	Knight	SMJ	Creativity/innovation	76		0.240	-0.020	0.210	0.130	.	.

Note. ASQ: Administrative Science Quarterly, SGR: Small Group Research, JAP: Journal of Applied Psychology, AMJ: Academy of Management Journal, PP: Personnel Psychology, GOM: Group and Organization Management, OBHD: Organizational Behavior and Human Decision Processes/Performance, HR: Human Relations, IJCM: International Journal of Conflict Management, SMJ: Strategic Management Journal, JOM: Journal of Management, OS: Organization Science, PR: Psychological Reports, AMLE: Academy of Management Learning and Performance, and DS: Decision Sciences.

APPENDIX B: STUDY CODING FORM

I. Study Identification Category

Author's Name : _____

Publication Year : _____

Publication Name : _____

Sample Size : _____

II. Team Diversity Category

A. Bio-demographic Diversity

1. Age: : _____
2. Gender : _____
3. Race/Ethnicity : _____

B. Job-related Diversity

1. Functional Expertise : _____
2. Educational Background : _____
3. Organizational Tenure : _____

III. Outcome Variables Category

A. Quality of Team Performance

1. Decision-making: : _____
2. Problem-solving : _____
3. Creativity/Innovation : _____

B. Quantity of Team Performance

1. Number of Outputs/Ideas : _____
2. Time to Complete a Task : _____

C. Social Integration

1. Member Satisfaction: _____
2. Team Cohesion : _____

IV. Moderators

1. Task Complexity:	Highly Complex [ ]	Less Complex [ ]	
2. Team Type:	Management Team [ ]	Project Team [ ]	Work Team [ ]
3. Team Size:	Large [ ]	Small [ ]	
4. Team Setting:	Organization [ ]	Laboratory [ ]	

APPENDIX C: INTERRATER AGGREEMENT FOR STUDY VARIABLES

(Random sample of 20 articles)

Study variable	Percent agreement
Study effect size correlation (*r*)	95
Sample size (*N*)	95
Study design	100
Decision-making	95
Problem-solving	85
Creativity/innovation	95
Number of outputs/ideas	90
Time to complete a task	90
Member satisfaction	92
Team cohesion	87
Highly complex task vs. less complex task	85
Management/project teams vs. work teams	90
Large team vs. small team	100
Organization setting vs. laboratory setting	100
Average Agreement	92.79 (SD = 5.22)

APPENDIX D: TRANSFORMED CORRELATIONS BETWEEN JOB-RELATED DIVERISTY AND TEAM PERFORMANCE

Studies	Outcomes	Job-related Diversity		
		Functional Expertise	Organizational Tenure	Education
Orlitzky (2003)	Quality-DM	.030		
Simons (1999)	Quality-DM	.070	.182	−.202
Sutcliff (1994)	Quality-DM	.050		
Klien (2001)	Quality-CI		.365	.050
Bantel (1989)	Quality-CI	.321	.020	.299
Bantel (1994)	Quality-CI	.213		.030
Cohen (1996)	Quality-CI	.633		
Keller (2001)	Quality-CI	.388		
Lovelace (2001)	Quality-CI	−.130		
Bantel (1993)	Quality-CI	.388		.343
Knight (1999)	Quality-CI	.245	−.020	.213
Keller (1994)	Quality-CI		.080	
Ancona (1992)	Quality-CI	−.266	.070	
Jehn (1997)	Quality-PS			.161
Orlitzky (2003)	Quality-PS		.000	
Smith (1994)	Quantity	.167		.229
Eisenhdart (1990)	Quantity	.245		
Pelled (1999)	Quantity	−.131	.377	
Keller (2001)	Quantity	.310		
Carpernter (2001)	Quantity	.020	.050	.050
Boeker (1997)	Quantity		.213	
Wiersema (1993)	Quantity		−.255	.151
Bantel (1994)	Quantity	.080		.310
Bantel (1993)	Quantity	.030		.040
Tihanyi (2000)	Quantity	.100	.141	.030
Lant (1992)	Quantity	.194		
Lant (1992)	Quantity	.229		
Smith (1994)	Quantity	.167		.229
Barsade (2000)	Quantity	.423		
Aconna (1992)	Quantity	−.010	−.277	
Keller (1994)	Quantity		.040	
Bunderson (2003)	Quantity	−.020	.172	
Jehn (1999)	Quantity	.203		

Note. DM: Decision-making; CI: Creativity/innovation; PS: Problem-solving.

APPENDIX E: TRANSFORMED CORRELATIONS BETWEEN BIO-DEMOGRAPHIC DIVERISTY AND TEAM PERFORMANCE

Studies	Outcomes	Bio-demographic Diversity		
		Age	Gender	Race
Smith (1994)	Quality-DM	.080		
Rodriguez (1998)	Quality -DM	.109	.501	.411
Orlitzky (2003)	Quality -DM		.131	
Bayazit (2003)	Quality -DM	.010	.090	-.030
Rodriguez (1998)	Quality -CI	-.640	.041	-.290
Klein (2001)	Quality -CI	.161	-.050	
Bantel (1989)	Quality -CI	.182		
Mortensen (2001)	Quality -CI			.245
Knight (1999)	Quality -CI	.131		
Harmon (1995)	Quality -PS		-.020	
Harmon (1995)	Quality -PS		.131	
Orlitzky (2003)	Quality -PS		.090	
Jehn (1997)	Quality -PS	.060	.010	.020
Pelled (1999)	Quantity	.090	-.192	-.020
Wiersema (1993)	Quantity	.070		
Jehn (1999)	Quantity		-.070	
Harmon (1995)	Quantity		.140	
Harmon (1995)	Quantity		.203	
Tihanyi (2000)	Quantity	.030		
Timmerman (2000)	Quantity	.030		.100
Timmerman (2000)	Quantity	.040		.020

Note. DM: Decision-making; CI: Creativity/innovation; PS: Problem-solving.

APPENDIX F: TRANSFORMED CORRELATIONS BETWEEN THE TWO TYPES OF TEAM DIVERISTY AND SOCIAL INTEGRATION

Studies	Outcomes	Job-related Diversity			Bio-demographic Diversity		
		Functional Expertise	Org. Tenure	Education	Age	Gender	Race
Rodrigez (1998)	Satisfaction				−.325	−.506	.000
Klien (2001)	Satisfaction		.050	.030	.213	−.141	
Smith (1994)	Satisfaction	−.330		.019			
Colquiltt (2002)	Team Cohesion				−.100		
Campion (1993)	Satisfaction	.151					
Keller (2001)	Team Cohesion	−.151					
Randel (2003)	Team Cohesion	−.111			−.020		
Martin (2003)	Satisfaction					−.040	−.020
Martin (2003)	Team Cohesion					-.020	.100
Martin (2003)	Satisfaction					.321	−.255
Martin (2003)	Team Cohesion					.310	−.203
Jehn (1999)	Team Cohesion	.161					
Jehn (1999)	Satisfaction	.080			.090	.141	
Harrison (1998)	Team Cohesion				−.020	−.182	.120
Campion (1996)	Satisfaction	.321					
Jehn (1997)	Satisfaction			.070	-.020	.070	.050
Barsade (2000)	Satisfaction	.299					
O'Reilly (1989)	Team Cohesion		−.182		.010		
O'Reilly (1989)	Satisfaction		−.161		−.120		
Chatman (2001)	Satisfaction				−.182		

APPENDIX G: ADDITIONAL ANALYSIS OF THE RELATIONSHIP BETWEEN TEAM SIZE AND SOCIAL INTEGRATION

Studies	Social Integration	Team Size
Amason (1996)	Team Cohesion	−.299
Campion (1993)	Member Satisfaction	.070
Smith (1994)	Member Satisfaction	−.464
De Dreu (2001)	Member Satisfaction	−.020
Baugh (1997)	Team Cohesion	−.182
Baugh (1997)	Member Satisfaction	−.121
Keller (2001)	Team Cohesion	−.245
Randel (2003)	Team Cohesion	.080
Dooley (1999)	Team Cohesion	−.141
Martin (2003)	Team Cohesion	.000
Martin (2003)	Member Satisfaction	−.040
Martin (2003)	Team Cohesion	−.182
Martin (2003)	Member Satisfaction	−.030
Harris (1998)	Team Cohesion	−.121
LePine (1998)	Member Satisfaction	−.277
Campion (1996)	Member Satisfaction	−.131
Vegt (2000)	Team Cohesion	−.100
Vegt (2000)	Member Satisfaction	−.110
O'Connell (2002)	Team Cohesion	−.131
Ancona (1992)	Member Satisfaction	−.050
O'Reilly (1989)	Team Cohesion	−.030
O'Reilly (1989)	Member Satisfaction	.151
Rentsch (2001)	Team Cohesion	−.321
Keller (1986)	Team Cohesion	−.299
Chatman (2001)	Member Satisfaction	−.171
Dailey (1980)	Team Cohesion	−.288
Barry (1997)	Team Cohesion	−.277
Mille (2001)	Member Satisfaction	.131
Jehn (1995)	Member Satisfaction	.110
Langfred (2000)	Team Cohesion	−.060
Langfred (2000)	Team Cohesion	−.141
Barrick (1998)	Team Cohesion	−.070
Schippers (2003)	Member satisfaction	.020
Schippers (2003)	Team Cohesion	−.181

The Mean Effect Size Correlation between Team Size and Social Integration: $\rho = -.13$*

* $p < .05$.