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A meta-analytic framework for understanding how leader-subordinate age differences impact leadership effectiveness ratings: A novel approach to relational demography

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A META-ANALYTIC FRAMEWORK FOR UNDERSTANDING HOW LEADER-SUBORDINATE AGE DIFFERENCES IMPACT LEADERSHIP EFFECTIVENESS RATINGS: A NOVEL APPROACH TO RELATIONAL DEMOGRAPHY

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DEDICATION

I would like to dedicate the following work to my unbelievably patient, kind, and

supportive Fiancée, Amy. You will never understand how much I have appreciated your

encouragement throughout this process. Thank you.

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TABLE OF CONTENTS

iv

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

Background.

The study of organizational demography addresses the relationship between demographic variables, and their impact on various outcomes within organizations (Lawrence, 1997). Research and theory in this area suggests that the demographic makeup of organizations and their subcomponents can meaningfully impact important organizational outcomes. For example, various forms of demographic dissimilarity (i.e., age, gender, race, education, and job tenure) between leaders and their subordinates are associated with negative outcomes for both groups of individuals, including negative perceptions of job effectiveness and personal attraction, and higher levels of role ambiguity (Tsui & O'Reilly, 1989).

Organizational demography can be studied from two perspectives: compositional demography and relational demography (Tsui, Egan, & Xin, 1995). Conceptually, these two approaches involve different definitions of demography, levels of analysis, and operational measures. The study of compositional demography focuses on the impact of group-level demographic composition on group-level outcomes (e.g., Alexander, Nuchols, Bloom & Lee, 1995; Bantel & Jackson, 1989; McCain, O'Reilly & Pfeffer, 1983; Pfeffer, 1983). In contrast, relational demography seeks to understand how comparative demographic characteristics of individuals at the individual-within-group level can explain outcomes at the individual level of analysis. As such, relational demography research has focused on the effects of demographic differences (e.g. differences in age, sex, tenure, education, or race) between individuals and members of

their work unit on individual level outcomes (e.g., Tsui, Egan and O'Reilly, 1992; Zenger and Lawrence, 1989).

While a great deal of relational demography research has focused on the individual-within-group level of analysis (e.g., studying differences between individuals and their peers), Tsui, Xin and Egan (1995) suggest that the influence of demographic characteristics between leaders and their subordinates has not been sufficiently addressed in this literature. Along similar lines, Vecchio (1993) notes that not enough attention has been paid to the impact of age differences between leaders and their subordinates on work-related outcomes (p. 112). The current investigation seeks to further our understanding of this idea, by investigating how age differences between leaders and their subordinates impact subordinates' ratings of their leaders' effectiveness.

From an applied perspective, it is important to study factors that impact subordinate ratings of their leaders because an increasing number of organizations have implemented 360° feedback as part of their performance appraisal systems. For example, Atwater and Waldman (1998) suggest that as many as 90-percent of Fortune 1000 companies use 360° feedback in one form or another. Such systems have gained popularity because they afford many benefits to organizations in terms of performance management and appraisal processes. Research in this arena has demonstrated that such systems gather better performance information (Mohrman, Resnick-West, & Lawler, 1989), offer more reliable ratings than those from single sources (Wohlers & London, 1989), support higher involvement styles for management (Budman & Rice, 1994; McGarvey & Smith, 1993), and lead to improved performance following feedback

(Atwater, Roush, & Fischthal, 1995; Daw & Gage, 1967; Smither, London, Vasilopoulos, Reilly, Millsap, & Salvemini, 1995).

Because one can directly study the extent to which comparative demographic characteristics of individuals within workgroups influence work outcomes, applying the theories and methods of relational demography provides a unique insight into the study of the dynamics of the leader-subordinate relationship. Indeed, research demonstrates that the relationship between subordinates and their leaders can affect subordinate reactions and behavior on the job (e.g. Abdel-Halim, 1982; Karasek, Triantis & Chaudhry, 1982; Repetti & Cosmas, 1991). Research in this area has explored the effects of both subordinate (e.g. Dedrick & Dobbins, 1991; Ferris, Yates, Gilmore & Rowland, 1985) and leader age (e.g. Gilbert, Collins & Brenner, 1990) on work attitudes, behaviors, and outcomes. Furthermore, this research suggests that leaders' demographic characteristics may interact with their subordinates' demographic characteristics to affect work outcomes, such as performance ratings (e.g. Cleveland & Landy, 1981; Schwab & Heneman, 1978).

When considering relational demography between leaders and subordinates, operationalizations typically follow one of two opposing perspectives; the specific outcomes of comparative demographic characteristics for subordinates (e.g., ratings of subordinates performance by leaders; Liden, Stilwell & Ferris, 1996; Tsui & O'Reilly, 1989), or the specific outcomes of comparative demographic characteristics for leaders (e.g., ratings of leadership effectiveness by subordinates; Vecchio, 1993; Collins, Hair, & Rocco, 2009). Relational demography research with respect to leaders and their subordinates has primarily focused on the former, or how demographic differences

between subordinates and their leaders affect workplace outcomes for subordinates. Indeed, there has been a great deal of research investigating how discrepancies between leader and subordinate age affect performance ratings that are assigned to subordinates by leaders (e.g., Liden, Stilwell & Ferris, 1996; Tsui & O'Reilly, 1989). What is less known is how demographic differences between employees and their leaders relate to the latter, that is, how they affect outcomes for leaders.

Subsequently, little research has investigated how subordinate ratings of their leaders are impacted by demographic discrepancies, and even less research has specifically focused on age discrepancies in this regard. Indeed, only two published studies have investigated how age differences between leaders and subordinates affect subordinate ratings of leader effectiveness (i.e., Vecchio, 1993; Collins, Hair, & Rocco, 2009). While these two studies – which are discussed in detail below – present compelling evidence for the impact that age differences have on subordinates' ratings of their leaders, many questions remain unanswered regarding the nature of this phenomenon.

The present study attempts to answer such questions by addressing some of the methodological concerns found in other research. In this regard, the current investigation is unique, as it seeks to understand how age differences between leaders and multiple subordinates (i.e., both younger than, and older than their leader) affect ratings that are assigned to leaders. However, before discussing further how the current study picks up from other research, it makes sense to first address the varying theoretical perspectives that support relational demography with respect to age

differences between leaders and subordinates, with a particular focus on subordinates' ratings of their leaders.

Theory Supporting Age-Based Relational Demography. The study of the nature of social interaction between leaders and their subordinates has a long history in the organizational sciences. For example, leadership research (e.g., Dansereau, Cashman, & Graen, 1973; Graen, Novak, & Sommerkamp, 1982) has long suggested that leaders do not use the same leadership style with all of their subordinates, and that unique exchange relationships develop between leaders and their subordinates over time. Given the long history of studying both age diversity and the nature of social interactions between leaders and their subordinates, it makes sense that there are several theories that are helpful in explaining the phenomena under investigation here. To understand these theories in the current context of age relational demography, it is helpful to classify these theories into two categories with regard to how age differences operate in the assessment of leadership effectiveness; specifically, non-directional versus directional theories.

This issue of directionality specifically addressed how age differences are predicted to impact the assessment of leaders' effectiveness. From a non-directional perspective (e.g., the similarity-attraction perspective, see below), any degree of age difference should matter in the assessment of leadership effectiveness (i.e., this effect should hold for both younger and older subordinates ratings, insomuch as ratings should be affected similarly for these two groups when compared with ratings provided by subordinates who are the same age as their leaders). From a directional perspective (e.g., the status congruence perspective, see below), age differences between older

subordinates and their younger leaders should result in lower ratings being assigned to such leaders (i.e., as compared to ratings provided by subordinates who are younger than their leaders). With this idea in mind, the following section reviews both non-directional and directional theories, including the rationale underlying the differences they predict, and their application to the current study.

Non-Directional Age Differences: The Similarity-Attraction Perspective.
Much of the research (e.g., Tsui & O'Reilly, 1989; Ferris, Judge, Chacere, & Liden, 1991) on relational demography has been studied under a theoretical perspective referred to as the similarity-attraction paradigm (Byrne, 1961, 1971). The similarity-attraction paradigm is rooted in the social-psychological principle of homophily (e.g., Lazarsfeld & Merton, 1954; Hinds, Carley, Krackhardt, & Wholey, 2000), which suggests that people tend to be attracted to those who share similar personal characteristics (e.g., attitudes, beliefs, physical attributes). Likewise, this theory has influenced several important theories of organizational behavior (e.g., ASA; Schneider, 1987). Evidence suggests that interacting individuals who are similar to one another share higher bases of reciprocal trust than interacting individuals who are dissimilar to one another (Hinds et al., 2000).

Drawing on this notion, Byrne (1961, 1971) proposed a theory of interpersonal attraction that specifies the conditions under which people are drawn to one another; the principle factor of which is said to be perceived similarity. Perceived similarity is said to "breed" attraction, because it can serve as an index for sensemaking and validation in our social environments (Festinger, 1954; Newcomb, 1961; Rand & Wexley, 1975). Rand and Wexley, (1975) suggest that expressions of similarity are

typically carried out as part of a reciprocal social process, wherein "…the extent that a person offers consensual validation by demonstrating similarity to us in some way, such an interaction will be perceived as being rewarding and lead to positive feeling toward this individual." (p. 536). Indeed, a great deal of social-psychological research on interpersonal attraction supports this notion (Baskett, 1973, Golightly, Huffman, & Byrne, 1971; Pulakos & Wexley, 1983; Rand & Wexley, 1975), and likewise supports Byrne's paradigm.

The basic prediction that follows from applying Byrne's (1961, 1971) paradigm to the study of relational demography suggests that the greater the difference between an individual and the members of their work unit, the less attracted the individual is to members of the unit. In terms of this similarity, demographic characteristics are typically immediately recognizable, highly salient features, which can strongly influence individuals' attitudes, perceptions, and reactions. Such effects may be particularly strong in ad hoc interpersonal relationships, such as those often encountered in the workplace.

Some relational demography research has suggested that when individuals differ demographically from other members of their work unit, they are more likely to psychologically or physically withdraw from such groups (Tsui, Egan & O'Reilly, 1992). The similarity-attraction paradigm suggests that the effects of demographic differences between individuals is symmetric, and that individuals respond negatively to demographic differences regardless of whether they exceed or fall short of unit norms. This idea is key to understanding the non-directional nature of this perspective; the

critical variable here is the amount of demographic difference experienced by the individual, not the direction of the difference (Pfeffer, 1985).

In terms of the current investigation, the similarity-attraction paradigm predicts that age differences between both older subordinates and their younger leaders, and younger subordinates and their older leaders, results in perceptions of dissimilarity. This effect should be particularly evident in workgroups with heterogeneous age distributions, because they may make age differences a salient and dichotomizing factor. Such perceptions may breed both psychological withdrawal from work (e.g., anger, frustration, resentment) and increase perceptions of inequity, or negative justice perceptions (e.g., Adams, 1965; Walster, Walster, & Bershcheid, 1978; see below).

One possible way in which these phenomena may affect workplace outcomes in the scenarios under investigation here is in the evaluation of leaders by their subordinates. Specifically, a subordinate who is older or younger than their leader may systematically alter the ratings they assign to their leader as a means of compensating for the negative associations and perceptions that stem from age dissimilarity. In essence, the similarity attraction paradigm suggests that, regardless of the direction (Pfeffer, 1985), age differences between leaders and subordinates may harbor negativity that affects the way in which leaders are viewed and assessed by their subordinates.

Non-Directional Age Differences: The Social Competition Perspective. While support for the similarity-attraction hypothesis has been garnered, research and theory concerning social comparison processes (e.g., Festinger, 1954) suggest that age similarity may breed perceptions of social competition, particularly in situations where

one is evaluating a similar other in a position of power. This perspective is rooted in the notion that social competition arises on the basis of social comparison processes (Goodman, 1976; Jones & Regan, 1974). The perception of competition may drive same age subordinates to rate their similarly aged leaders lower than either older or younger subordinates.

Lawrence's (1984, 1988) theory of organizational age grading, which is discussed at length below, suggests that people often use their own age as a benchmark for their career progression and success, particularly in comparison to positions held by similarly aged others. These types of comparisons are particularly meaningful within one's own workgroup, and having a similarly aged leader may serve as a pervasively salient reminder that one is not "on time" with respect to their own goals and proposed career trajectory.

Thus, applying the principles of social comparison theory here, it is possible that age similarity between subordinates and their leaders can be associated with perceptions of social competition, manifested in contention or professional antagonism. In such situations, feelings of jealousy and hostility may accompany competitive, rivalrous interactions (e.g., Tjosvold, 1991). Pelled, Eisenhardt, & Xin (1999) suggest that in demographically similar workgroups, similarity between subordinates and their leader may result in this type of intragroup emotional conflict. As workgroups become more homogeneous, individuals generally have more exchanges with similar others, and as a result tend to rely more on social comparisons, thus exacerbating this process.

Pelled, Eisenhardt, & Xin (1999) further suggest that some forms of demographic similarity are stronger triggers of social comparisons than others. Specifically,

demographic attributes can be classified by career relatedness, suggesting that this is a defining factor in terms of whether demographic similarity breeds social competition. What defines the career-relatedness of a demographic characteristic is said to be the degree to which that attribute is considered in formal and informal assessments of career progress.

Because people are particularly attuned to career achievements in the work context, when employees engage in social comparison at work, they tend to look towards demographic characteristics that are linked to career progress, such as age, tenure, and hierarchical position. These types of demographic characteristics that are, at least on the surface, indicative of career related success are therefore particularly likely to yield the jealously and rivalry that are indicative of social competition.

Because of the strength and pervasiveness of organizational age norms, employees tend to expect their careers to progress as they age (Lawrence, 1988). Hence, workers may use similarly aged people as benchmarks to judge their own career progression. Furthermore, because of organizational age norms, the effect of social comparisons based upon age similarity are stronger for more proximally aged comparisons, than for distally aged comparison. For example, a 25 year old is more likely to be concerned about a 27-year-old rising to a position of power than a 50-year-old.

Since formal performance evaluations typically compare employees from the same workgroup (e.g., Kirkpatrick, 1986), group members may be especially inclined to focus on similar others within their own workgroup when making social comparisons. This social comparison process, and the resulting social competition that arises should

be particularly evident when subordinates are rating the effectiveness of their similarly aged leader.

Directional Age Differences: The Status Congruence Perspective. Research on relational demography in organizations has devoted some attention to how perceived age distributions are constructed, and the impact they have on leader-subordinate relationships (e.g., Liden, Stilwell & Ferris, 1996; Tsui & O'Reilly, 1989; Vecchio, 1993). Such studies often seek to explain differences between status congruent (SC) and status incongruent (SIC) leader-subordinate relationships. The notion of age and status congruence suggests that there are perceived norms associated with leader-subordinate age differences that are based on the assumption of an implicit organizational age grading phenomena (Lawrence, 1984). The notion of implicit organizational age grading is rooted in the social psychological principles of self-perception (e.g., Bem, 1967, 1972), and social comparison (e.g., Festinger, 1954), and suggests an active self-contextualization process occurs, by which people gain insight via comparisons with similar others in the workplace.

Lawrence (1984) suggests that peoples' perception of age distributions within organizations are the most salient factors in the construction of such implicit age norms, and that people actively use such age norms as indicators of their career progression. As such, Lawrence (1984) demonstrates that people who see themselves as "behind time" (i.e., SIC) with respect to others tend to have more negative attitudes towards work than others who are "on time" (i.e., SC). While the influence of SC and SIC relationships have been studied for a variety of important organizational outcomes –

including leadership ratings – studies of this phenomenon have presented inconsistent results with regard to the influence of status congruence on such outcomes.

With respect to leadership ratings provided by subordinates, one possible reason for these inconsistencies is that the influence of age-related SC/SIC has been studied by aggregating ratings or responses given by SC and SIC subordinates independently, and looking for main-effect differences (i.e., mean differences) between these groups. Such differences are calculated without reference to a specific leader, and are treated as a group level phenomenon. What this means is that such studies have assumed that the influence of differences between leaders should be irrelevant to the ratings that their subordinates assign to them, and that the effects of SC/SIC are the more salient predictors of rating or response differences.

In terms of the current investigation, the notion of status congruence and organizational age norms serves to explain why older subordinates may systematically rate their younger leader's performance lower. Specifically, because older subordinates are, by definition, in status incongruent workgroups (i.e., as a function of their age in relation to their younger leaders), one may expect negative reactions to such leaders, which may play out in ratings characterizing their effectiveness as leaders. This status incongruence effect is driven by implicit age grading norms to the extent that subordinates in status incongruent workgroups perceive such age norms as being particularly salient, and use such norms to guide their ratings.

To understand the mechanisms by which status incongruence and age grading norms affect ratings given to younger subordinates, it is helpful to look to the organization justice literature, and particularly to equity theory (e.g., Adams, 1965;

Walster, Walster, & Bershcheid, 1978). Specifically, the underpayment inequity perspective suggests that people who perceive that they are not getting their share of valued allocations may unconsciously retaliate in various subversive ways in order to compensate for this discrepancy. One such manifestation may be the subtle, yet systematic altering of ratings assigned by older subordinates to their younger leaders.

Another perspective that can help to explain the mechanisms of status incongruence and age grading norms comes from social psychological theories of social identity and self-categorization. Both social identity theory (Tajfel & Turner, 1986) and self-categorization theory (Turner, 1987), posit that people classify themselves and others into groups using salient and personally relevant criteria, such as age. Such classifications are important because they are used to make distinctions between similar and dissimilar others – commonly referred to as in- and out-group members, respectively.

Because humans are by nature motivated to enhance their self-esteem (e.g., Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004) we generally tend to respond unfavorably when our social identity is threatened. Indeed, threats to social identity may engender negative effects, such as discrimination and in-group bias, particularly by those who are members of social outgroups. Social identity threats can take various forms. In the workplace, one possible threat is dissimilarity to one's coworkers. Dissimilarity in this regard is likely to increase one's identity salience, or extent to which one's group membership is a central component of their self-concept (Thompson, 1999). Increasing identity salience tends to correspond to increases in concerns regarding the values of one's identified group (Hogg & Terry, 2000; Randel,

2002). One frequent coping strategy that people often apply when faced with threats to self concept, including heightened identity salience, is disengagement, which typically engenders psychological or physical withdrawal to avoid further identity threats (O'Briend & Major, 2005).

Applied in the current context, identity threats resulting from age dissimilarity between subordinates and their leaders may support disengagement from work roles, and affect ones' interactions with, and potentially the ratings assigned to, their leaders. As a result of such disengagement, older subordinates may perceive, and as a result rate, the effectiveness of their leaders lower than would younger subordinates for whom this disengagement process has not affected (i.e., because it has been buffered by processes defined by age grading and norming; Lawrence, 1984, 1988).

Applying social identity and self-categorization theories further, the notion of in-group bias has served as one theoretical basis for the relational demography framework (Tsui & O'Reilly, 1989). As suggested previously, this framework proposes that individuals prefer and respond more favorably to contexts containing greater proportions of in-group members. For example, research investigating demographic similarity in race, sex, age, education, and tenure (e.g., Tsui & Gutek, 1999) suggests these demographic characteristics result in stronger perceptions of similarity in values and historical experiences, and lead to enhanced cohesion among workgroup members (Mehra, Kilduff, & Brass, 1998). In terms of age, research suggests that the presence of similarly aged coworkers is likely to affirm age-group identity, thereby heightening identification with one's coworkers. In turn, greater identification with one's workgroup should relate to greater job meaningfulness and engagement (Kahn, 1990, 1992).

However, identification with regard to age may be particularly low in the workgroups investigated by the current study (i.e., leaders with both older and younger subordinates). Thus, one would expect that the benefit of age similarity would be mitigated in such situations.

Directional Age Differences: The Loyalty and Commitment Perspective.
While some empirical support has been garnered in support of status congruence effects in relational demography research, a competing explanation of directional age differences does exist. This so-called loyalty and commitment perspective suggests that higher levels of loyalty and organizational commitment among older subordinates (e.g., Michaels & Spector, 1982; Morris & Sherman, 1981; Steers, 1977) translate to ratings of leadership effectiveness that are higher than those provided by younger subordinates.

Along these lines, Vecchio (1993) hypothesized that subordinates who are older than their leader may, in fact, be more loyal and supportive because of greater levels of organizational and professional commitment, whereas younger employees may be comparatively less supportive. Borrowing from Schneider (1987), one possible explanation for the association between employee age and loyalty and commitment are differences in attrition rates. Specifically, one could posit that more committed employees are inclined to stay with an organization; where as less committed employees tend to leave. Employees who differ from group norms that dictate levels of commitment and leader supportiveness are pressured to follow specific attrition processes. Thus, over time, older employees (i.e., those with more tenure) are likely to have more positive attitudes towards their leaders (e.g., Fisher, 1986).

This line of reasoning suggests that age differences are not the direct cause of differences in performance ratings. Rather, a specific pattern of results is predicted as a consequence of tenure being positively associated with positively valenced work-related outcomes. In terms of the predicted results for the current investigation, this perspective suggests that ratings provided by older subordinates should be more positive than those for values for the age-equivalent group, or the younger group. Another way to conceptualize this effect could be as a social competition effect for younger subordinates, as compared to older subordinates. That is to say, younger subordinates with goals for career progression may rate their leader lower than older subordinates as a means of painting them in a negative light, ultimately in an attempt to further their own desire to more quickly ascend through the ranks of their organization. This effect could be exacerbated by loyalty and commitment on the part of older subordinates, thus these two processes may operate in tandem to affect leadership effectiveness ratings in a non-directional fashion.

Summary of Theoretical Perspectives. Taken together, these two classes of theoretical perspectives (i.e., non-directional and directional) suggest that there are two competing phenomena that could potentially influence subordinates ratings of leaders' effectiveness.   From the non-directional perspective (e.g., similarity-attraction; social competition), any degree of age difference between leaders and their subordinates is expected to negatively impact subordinates assessment of their leaders' effectiveness. From the directional perspective (e.g., status congruence; loyalty and commitment) differences between younger and older subordinates (i.e., relative to leader age) are expected to impact ratings of leadership effectiveness.

The Current Study.

With these theoretical perspectives in mind, the current study attempts to address several substantive and methodological gaps in the relational demography literature by employing novel methods and robust statistical analyses to test for the presence of age differences between subordinates ratings of their leaders. As suggested, the current investigation is unique in this regard, as it seeks to extend previous research on this phenomenon. Like past studies (i.e., Vecchio, 1993; Collins, Hair, and Rocco, 2009) the current study tests the impact of subordinate age differences (i.e., with reference to leaders age) on the ratings of leadership effectiveness. As will be discussed below, the current investigation is unique in its approach to testing for such differences, because a) participants (i.e., leaders and their subordinates) are purposefully sampled from organizations where leaders have multiple subordinates of varying ages, which allows for leadership behavior to be "controlled" within each comparison, and b) meta-analytic tools are employed to analyze the nature of the relationship between ratings provided by different aged subordinates of the same leader. This analytic strategy allows for the investigation of these phenomena across numerous workgroups comprised of leaders with multiple subordinates.

With these points in mind, it makes sense to turn our attention to a discussion of literature regarding relational demography for leaders and subordinates, with a specific focus on the perspective of subordinates' ratings of their leaders. From this discussion, a better understanding of the methodological limitations of prior research should become apparent.

Ratings of Leaders by Subordinates. As suggested, there are only two published studies that have investigated age-related relational demography from the perspective of how subordinates' age – in relation to leaders' age – affects how subordinates' rate their leaders (i.e., Vecchio, 1993; Collins, Hair, and Rocco, 2009). The first of these studies, Vecchio (1993), tested four competing models (i.e., status congruence, similarity-attraction, social competition, & loyalty and commitment) to explain the influence of the difference between subordinates' age, and the age of their immediate leader, on ratings of leadership performance.

Using a sample of high school teachers and their principals (i.e., as "subordinates" and "leaders," respectively), the results presented by Vecchio (1993) suggest that teachers who were older than their principals both a) reported better working relations with their principals, and b) evaluated their principals more favorably (i.e., in terms of consideration, structuring, leader-member exchange, and satisfaction with supervision). As explored below, the results of this study are at odds with other research in this area (i.e., Collins, Hair, and Rocco, 2009), and with the predictions of the current investigations.

The second of the two published studies investigating this phenomena, Collins, Hair, and Rocco, (2009), is predicated on the theory of status incongruence (see above), which the authors suggest is the emerging phenomena (i.e., the phenomena of the "aging workforce" means that older workers are increasingly reporting to younger leaders – a fact that is bringing about a role reversal that violates established age norms). Contrary to the findings presented by Vecchio (1993), the results of this investigation provided evidence for a status incongruence effect, specifically that in

contrast to younger subordinates ratings of their younger leaders, older subordinates a) expect less from their younger leaders, and b) rate their younger leaders leadership behavior lower.

Despite the conflicting findings of these two studies, the results presented are compelling, and beg for more careful investigations of these phenomena. However, as often cited, no study is without some limitations, and a careful consideration of the potential methodological limitations of this past research help to inform our understanding of the current investigation. Regarding these methodological issues, recall that Vecchio, (1993) focused on age differences in subordinates ratings of their leaders' behavior and the nature of their working relationships. This study was conducted with a sample of teachers (i.e., subordinates) and their principals (i.e., leaders), and thus cannot be easily generalized to a more traditional conception of organizational subordinate-leader relationships. To address this limitation, participants in the current study are leaders and their subordinates who have been broadly sampled from multiple organizations.

A second methodological limitation of Vecchio (1993) is that this study operationalized age as the difference between the ages of individual subordinates and their leaders. This difference was used to predict whether subordinates with more extreme levels of age discrepancy rated their leaders differently than those with less discrepancy on this variable. This strategy captures the dyadic difference between individuals and their leaders, but cannot demonstrate how interactions among similarly aged workgroup members might account for differences in ratings (this choice was likely made because of the low number of leaders that were present in this study; $n = 14$).

While this is an interesting approach to understanding the influence of age differences on workplace outcomes, this method does not allow for the impact of age discrepancies between subordinates and leaders to be tested from a true relational-demography perspective. The current study addresses this limitation by focusing on a much larger number of leaders who are each responsible for multiple subordinates of varying ages. By testing how these effects play out amongst multiple subordinates of the same leader, the hope is that a clearer picture of the relational effects of age demography within such workgroups can be gained.

Collins, Hair, and Rocco (2009) relied on different methods than Vecchio (1993) to arrive at conclusions regarding the impact of age discrepancies on subordinates' ratings of their leaders' effectiveness, however a discussion of some methodological concerns for this study is still warranted. Specifically, while the results of Collins, Hair, and Rocco (2009) are compelling and informative for the current investigation, the method employed in their study is problematic for three reasons:

First, study participants (i.e., subordinates) were sampled broadly from multiple organizations, and asked to provide ratings of their current leaders, however multiple subordinates were not sampled from each leader or organization. This type of cross-sectional design does not allow for one to study the contextual influence of specific organizations on how leader-subordinate age discrepancies affect performance ratings for leaders. As suggested above, the current study addresses this by focusing on specific leaders who are responsible for both younger and older subordinates, thus "controlling" for the influence of the leadership (i.e., individual differences in leaders) when comparing subordinates' ratings.

Second, this study adopted a main effect paradigm, whereby individual ratings of leader effectiveness were averaged across raters who were younger than, or older than their leaders. Mean differences were then calculated (i.e., older raters vs. younger raters) with respect to the ratings assigned to leaders. This analysis strategy does not allow one to control for the influence of individual leaders. Specifically, individual differences in leadership style may impact the ratings that subordinates assign to leaders, regardless of age. Treating all ratings from younger and older subordinates as the same is problematic because it assumes that individual differences in leadership behavior are irrelevant to the ratings being assigned. What makes better sense from a theoretical and methodological standpoint is to look for age differences between subordinates of single leaders, and discern if ratings differ based on actual age discrepancies between leaders and subordinates. The current study aims to achieve this specific goal.

Finally, it is worthwhile to note that Collins, Hair, and Rocco (2009) used an anonymous survey in which there was no possibility for the ratings assigned to leaders to have an influence on future outcomes – this may have led to different motivations among raters. Because of the interactive nature of workgroups, there is an implicitly different set of dependencies and motivations underlying raters' decision making process; such dependencies and motivations have the potential to affect ratings, particularly when contrasted with anonymous ratings that were collected for research purposes. This limitation is addressed by the current study by using data collected within actual organizations where the interpretations of leadership ratings could potentially impact various high-stakes decisions (e.g., promotion, development, etc.).

Hypotheses.

Based upon the above reviewed research, the current study tests two sets of competing hypotheses. This strategy was adopted because the results of previous relational demography research has been largely equivocal with respect to the influence of leader-subordinate age difference on subordinates ratings of their leaders. As such, a strong inference approach (e.g., Platt, 1964) is adopted herein, where competing hypotheses are tested. Support for such hypotheses serves as evidence for the various theoretical propositions described as explanations for the phenomenon under investigation.

Hypthesis 1a. The first hypothesis (H1a: similarity-attraction – i.e., non-directional age differences) suggests that there is a main-effect difference between the ratings provided by older and younger subordinates (i.e., dissimilar) and subordinates who are the same age as their leaders (i.e., similar). To support this hypothesis, an overall main effect difference between similar and dissimilar subordinates would need to be observed; this difference would indicate that dissimilar subordinates provide lower ratings to their leaders than similar subordinates.

As suggested above, an interesting alternative to this hypothesis suggests a different explanation for observed non-directional age differences; this effect is referred to as a social competition effect. Vecchio (1993) suggests that social competition that arises on the basis of social comparison processes (Goodman, 1976; Jones & Regan, 1974) may drive same age subordinates to rate their leaders lower than either older or younger subordinates. This notion is again borrowed from Lawrence (1984, 1988), who suggests that subordinates who are roughly equal to their leader in terms of age

may be inclined to consider the possible adverse implications of their own career progress when evaluating their leader's effectiveness.   Because of professional competition within a generational cohort, subordinates who are roughly the same age as their leaders may provide lower evaluations of their leadership effectiveness relative to subordinates who are younger or older. Thus, the predicted pattern of results from this perspective is the inverse of that offered by the similarity-attraction hypothesis (i.e., H1a) — that is, same age subordinates would provide lower ratings than either older or younger groups of subordinates.

Hypothesis 1b. The second hypothesis (H1b: status congruence – i.e., directional age differences) suggests that there is an overall main effect difference between ratings provided by older subordinates (i.e., Status Incongruent, SIC), and those provided by subordinates who are younger than their leaders (i.e., Status Congruent, SC). To support this hypothesis, an observed main effect difference between older subordinates, and younger subordinates would need to be observed; this difference would indicate that SIC subordinates provide lower ratings to their leaders than SC subordinates.

As suggested previously, there is a theoretically justified alternative to the status congruence effect proposed by hypothesis 1b. That is, older subordinates may provide ratings of their leaders that are higher than younger subordinates (e.g., Vecchio, 1993). This interpretation may be classified as a loyalty and commitment effect for older subordinates, and can be explained by evidence that older subordinates generally have higher levels of organizational and professional commitment, whereas younger employees may be comparatively less supportive (e.g., age has been found to positively

relate to organizational commitment; Michaels & Spector, 1982; Morris & Sherman, 1981; Steers, 1977).

Hypotheses 2a & 2b. The next set of competing hypotheses (hypothesis 2a and b) specifically builds off of support of hypotheses 1b, and refers to whether, in reference to younger raters, leader's ratings by older raters differ by effectiveness dimension. If ratings differ by dimension, it is possible that a stereotype effect is occurring. Indeed, there is a preponderance of evidence that suggests that age-related stereotypes may influence the way in which people judge other individuals (see Posthuma & Campion, 2009 for a thorough review). While a majority of this literature has focused on stereotypes of older workers, an emerging area of study in this regard focuses on stereotypes of younger workers. In the present study, the way in which such stereotypes are expected to manifest are at the dimension level of evaluation – specifically with regard to how older subordinates assess their younger leaders on the various components that comprise leadership effectiveness.

Emerging evidence concerning perceptions of generational differences in the workplace suggests that older subordinates may hold negative impressions of their younger leaders. These findings are not surprising given the literature reviewed above concerning directional differences. While there is little evidence for the validity of generational differences in the workplace (Deal, Altman, & Rogelberg, 2010), there is burgeoning evidence to suggest that younger individuals can be perceived negatively; such perceptions may contribute to likewise negative evaluations of their effectiveness as leaders. Such negative impressions serve as heuristics that have the potential to influence the evaluation of others in much the same way that stereotypes have been

demonstrated to impact evaluative workplace outcomes for other groups in similar contexts (e.g., Baltes, Bauer, & Frensch, 2007; Baltes & Rudolph, 2009, Bauer & Baltes, 2002**).**

Regarding stereotypes of younger employees held by older employees, it has been documented that younger individuals are perceived as difficult to work with, entitled, and overly "service" focused (e.g., Hira 2007; Myers and Sadaghiani 2010). Furthermore, younger individuals have been perceived as less mission-oriented, dependable, involved, and loyal to their organization (e.g., Smith, 2008). Interestingly, there is some evidence to suggest the validity of such impressions – specifically work centrality (i.e., one's identification with work and the strength of involvement with working, as well as a general belief about the value of working in one's life; MOWIRT, 1987) has been found to be lower for younger individuals, however the magnitude of this effect is relatively small (Smola and Sutton 2002**;** Twenge et al. 2010).

In summary, there is evidence to suggest that older generations perception of younger generations in the workplace can be negative. Because such perceptions can influence judgments, it is expected that older subordinates view and subsequently evaluate their younger leaders lower on dimensions of leadership effectiveness that closely match onto these dimensions. The instrument used in the current investigation measures leadership effectiveness on four traits – adaptability, mission, involvement, and consistency. Following the literature reviewed previously concerning intergenerational stereotypes, it is expected that older subordinates may view their younger leaders as lower on mission (i.e., younger generations are perceived as being less mission-oriented and less loyal to their organization, Smith, 2008), involvement

(i.e., younger generations are perceived as being less involved, Smith, 2008; likewise, younger generations may possess lower levels of work centrality, Smola and Sutton 2002; Twenge et al. 2010), and consistency (i.e., younger generations are perceived as being less dependable, Smith, 2008; likewise, younger generations are perceived as working less, and with lower intensity, Deal, Altman, & Rogelberg, 2010). If ratings differ in this way, evidence for a stereotype effect would be garnered (i.e., H2a – stereotype effect for older subordinates ratings of their younger leaders).

However, if ratings are "universally negative" for older raters, this serves as evidence for a pure status incongruence effect (i.e., H2b, pure status incongruence effect for older subordinates ratings of their younger leaders). Because status incongruence is expected to operate in the aggregate, it should impact all dimensions similarly. Thus, assuming a status incongruence effect (H1b, see above), further evidence for status incongruence can be observed to the degree that ratings provided by older raters do not differ by dimension.

CHAPTER 2: METHOD

Participants.

Participants were leaders and their subordinates ($n_{leaders}$ = 449, $n_{subordinates}$ = 2502) sampled from 89 different organizations. Table 1 contains a summary of the age breakdown of leaders and subordinates across organizations for the total sample. Due to missing data, and different operationalizations of age differences between leaders and subordinates for the hypotheses tested, the total number of leaders and subordinates varied by analysis. Tables 3 through 8 specify the $K_{Leaders}$ and $N_{Subordinates}$ under consideration for each analysis conducted herein.

Participants were drawn from the archival database of Denison Consulting, a culture and leadership development consultancy. Denison Consulting develops and manages several types of diagnostic surveys, rooted in research linking organizational culture and leadership to bottom line performance outcomes. The Denison model and diagnostic surveys are designed to help organizations align culture and leadership. Participants were chosen based upon the demographic makeup of the workgroup, specifically to maximize the heterogeneity of subordinates' age with respect to leader age.

Materials.

Independent Variable: Leader and Subordinate Age. Leader and subordinate ages were based off of self-reported categorical variables. Both leader and subordinate ages are classified under the following categories: 60 and Over, 50-59, 40-49, 30-39, 20-29, Under 20. Due to the nature of the hypotheses suggested above, subordinates' ages, in relation to their leaders, were defined in multiple ways. Specifically, to facilitate

testing hypothesis 1a (i.e., non-directional age differences) "older subordinates" were defined as those subordinates who self-reported being in an older age category than their leaders; "same age subordinates" were defined as those subordinates who self-reported being in the same age category than their leaders, and "younger subordinates" were defined as those subordinates who self-reported being younger than their leader. Because of the non-directional nature of this hypothesis, "older" and "younger" subordinates ratings were collapsed, and compared to "same age" subordinates ratings.

To facilitate testing hypothesis 1b (i.e., directional age differences) "older subordinates" were defined as those subordinates who self-reported being in an older age category than their leaders, and "younger subordinates" were defined as those subordinates who self reported being in a younger age category than their leaders. Recall that Lawrence (1989) suggests that age norms dictate status congruency. Specifically, subordinates who are older than their leaders violate organizational age norms - however subordinates who are younger should, by definition, not be in violation of such norms. Thus, status incongruence was conceptualized as being older than ones leader, and status congruence as being younger than one's leader. Therefore, hypothesis 1b was tested by comparing ratings provided by "younger" and "older" subordinates.

It should be noted here that the archival nature of the data used here necessitated conceptualizing age as a categorical variable. This is not an ideal condition for testing the relational demography effects proposed, because the comparisons that have been hypothesized rely on comparisons between specific relational ages (i.e., similar vs. dissimilar; older vs. younger), and age categories may

allow for undesirable of overlap between subordinates ages. As a results of this potential overlap, it should be noted that any significant effects of age found here should be considered very conservative estimates of the effects that would occur if continuous age could have been used here.

Dependent Variable One: Denison Leadership Development Survey. All subordinates completed the Denison Leadership Development Survey (DLDS), rating their leader as the target. The DLDS is a 360° assessment of leadership effectiveness that is based on the four pillars of Denison and Neale's (1996) leadership framework (see Figure 1). The DLDS is a diagnostic tool that provides leaders and managers with feedback on a set of twelve leadership skills and practices that can impact bottom-line organizational performance. The DLDS measures specific aspects of an individual manager's leadership skills and practices, and benchmarks them to other leaders. The DLDS is comprised of ninety-six items (See appendix 1) that define twelve separate measures of four basic traits (Involvement, Consistency, Adaptability, and Mission). These items are rated on a seven-point agree-disagree scale; a response of seven indicates that the respondent strongly agrees. The survey also compares an individual manager's self-perception with that of his/her co-workers using confidential 360-degree feedback. Surveys are collectively tabulated into the individual's data file, and results are graphically presented in a summary report.

As suggested above, Denison and Neale's (1996) leadership framework identifies four broad leadership traits; Involvement, Consistency, Adaptability, and Mission. Each of these traits is measured with three indexes made up of eight survey

items each.   These four broad leadership traits are described in terms of specific leadership behaviors below:

Involvement is defined by behaviors that build human capability, ownership and responsibility. Individual managers who create "high-involvement" encourage others to be involved and create an environment of experimentation and exploration, as well as a sense of ownership and responsibility. Highly involved individual managers depend on informal, voluntary and implicit leadership skills to move their work group or organization forward rather than formal, explicit, bureaucratic directives. Out of this sense of ownership grows a greater commitment to the organization, an increasing capacity for leadership, and a sense of autonomy. Receptivity to the ideas of others increases leadership quality and improves implementation of new ideas. The three measures of the Involvement role are: Empowers People; Builds Team Orientation; and Develops Organizational Capability.

Consistency is defined by behaviors that support the values and systems that are the basis of strong leadership. Consistency provides a central source of integration, coordination and control. Consistent individual managers develop a mindset and a set of operations that create an internal system of governance based on consensus. They have highly committed employees, key central values, a distinct method of doing business, a tendency to promote from within, and a clear set of "do's and don'ts." Consistency produces leadership based on a shared system of beliefs, values, and symbols that are widely understood by members of a work group or organization. Implicit control systems based on internalized values can be a more effective means of

achieving coordination and integration than external-control systems that rely on explicit rules and regulations.

The power of leadership consistency is particularly apparent when organizational members encounter unfamiliar situations, when it enables leadership to react in a predictable way to an unpredictable environment by emphasizing a few general, value-based principles on which actions can be grounded. The three measures of the Consistency role are: Defines Core Values; Works to Reach Agreement; Manages Coordination and Integration.

Adaptability is defined by behaviors that translate the demands of the organizational environment into action. Successful individual managers hold a system of norms and beliefs that support his or her capacity to receive and interpret signals from the environment and translate them into internal changes that increase the organization's chances for survival, growth and development. Three aspects of adaptability influence an individual manager's effectiveness. First is the ability to perceive and respond to the external environment. Successful individual managers are very focused on their customers and their competitors. Second is the ability to respond to internal customers, regardless of level, department or function. Third is the capacity to restructure and re-institutionalize a set of behaviors and processes that allow the organization and its employees to adapt. Without this ability to implement adaptive response, an organization cannot be effective. The three measures of the adaptability role are Creates Change, Emphasizes Customer Focus, and Promotes Organizational Learning.

Mission is defined by behaviors that further a meaningful long-term direction for the organization. The individual manager's mission provides purpose and meaning by defining goals and a purpose for his or her unit. It provides a clear direction that defines an appropriate course of action for the individual manager and his/her employees. The individual manager is able to align the mission and goals for his/her functional area or unit to the mission and goals of the organization. A sense of mission allows an individual manager to inspire, to direct activities, and to formulate strategy by envisioning a desired future state. Being able to translate his/her mission into action contributes to both short and long-term commitment to the organization. Success is more likely when individual managers and organizations are goal directed. The three measures of the Mission role are: Defines Strategic Direction and Intent; Defines Goals and Objectives; and Creates Shared Vision.

Hooijberg and Denison (2003) provide evidence for the validity and reliability of the DLDS. Regarding validity, Hooijberg and Denison (2003) conducted confirmatory factor analyses testing both the latent variable factor structure of the DLDS, and the underlying structure of the twelve DLDS indices. Strong support was garnered for the structural relationships specified by the DLDS model – Specifically, a four-trait latent variable model reflecting the four basic traits (Involvement, Consistency, Adaptability, and Mission) was found to fit the data better than a null model, and the twelve indicators (i.e., three indicators per trait) of these four latent variables were found to fit the data better than single indicators for each trait. Regarding reliability, Hooijberg and Denison (2003) reported coefficient alphas for indices ranging from .88 (promotes organizational learning) to .94 (creates shared vision); Applying Nunnally's (1978) criteria for

interpreting the quality of scale reliability, all indices of the DLDS demonstrate good reliability. For the current sample, coeffient alpha's indicated very good reliability for the total index ($\alpha_{Overall}$ = 0.990), and for each dimension ($\alpha_{Adaptability}$ = 0.961; $\alpha_{Consistency}$ = 0.964; $\alpha_{Involvement}$= 0.968; $\alpha_{Mission}$ = 0.974).

Dependent Variable Two: Denison General Leadership Effectiveness Survey. All subordinates completed the Denison General Leadership Effectiveness survey (DGLES), rating their leader as the target. The DGLES is a 7-item index of leadership effectiveness that assesses behaviors that are indicative of effective leadership (See appendix 4). The DGLES is scaled on a 1-to-7 Likert-type scale, anchored with strongly disagree and strongly agree. For the current sample, coefficient alpha indicated very good reliability (α = 0.95), and inter-item correlation coefficients ranged from r = .63 to r = .85.

Furthermore, because of the unpublished nature of this scale, construct validity and psychometric evidence is not available in the literature. Thus, a confirmatory factor analysis was conducted to confirm the one-factor structure of this index. Specifically, using a Maximum Likelihood estimation method, a one-factor model was specified using IBM AMOS v.19.0. This model fit the data well (CFI = 0.98, NFI = 0.98, RMSEA = 0.08), and all specified factor loadings were significant, ranging from λ_x = 0.75 to .92. Furthermore, squared multiple correlations representing the amount of variance explained in each item by a single latent variable, ranged from R^2= 0.56 to 0.85. This provides strong evidence for the unidimensionality of this index. In terms of convergent validity evidence, this scale correlated highly with the DLDS, both at the composite, and the dimension level (See table 2).

Procedure.

As suggested previously, this study relies on archival data from Denison Consulting. Specifically, the data used here are subordinates' ratings of their leaders' effectiveness on both the Denison Leadership Development Survey (DLDS) and the Denison General Leadership Effectiveness survey (DGLES). Across all leaders, Denison Consulting collected subordinate ratings via a secure internet-based survey. This type of data is routinely collected by Denison as part of its consulting ventures concerning organizational leadership and culture development.

Thus, data on leaders' ratings was broadly sampled from a number of organizations that have contracted with Denison Consulting, and have completed the DLDS along with their subordinates. To qualify for inclusion, leaders were identified with multiple subordinates of varying ages (e.g., older, the same age, or younger). This decision was made to facilitate testing the aforementioned hypotheses, and is a unique advantage of the current study - particularly when contrasted to past investigations of this phenomena that have not considered differences between multiple subordinates' ratings with respect to a single leader (i.e., Vecchio, 1993; Collins, Hair, & Rocco, 2009).

Analyses.

As suggested above, most relational demography literature concerning age and performance ratings has not considered the entire work unit as much as it has focused on understanding how age differences at the dyadic level are related to outcomes for either leaders or subordinates. This method is unfortunate because a majority of the theory that supports the predictions of relational demography effects with respect to age

and performance ratings suggests that differences in ratings are a function of leader age in reference to the demographic makeup of their subordinates. The current study adopts an analytic framework for understanding these effects that focuses on leaders who can be classified as having subordinates who are younger, older, and in some cases the same age as themselves. These subordinates have provided ratings of their leaders' effectiveness on common leadership development inventories (i.e., DLDS; DGLES). As a result, the ratings provided for any given leader by their subordinates were collapsed by age group, and an average taken that represents mean level ratings provided by subordinates of a given age group.

Once collapsed into means, a standardized mean difference (i.e., effect size) was computed for the difference between the ratings subordinates assign to their leader. For any given leader, this statistic suggests the degree to which subordinates of different ages differ in the ratings that they have assigned to their leader. This procedure was conducted for every leader in the sample, and effect size estimates were derived as mentioned previously. Once collected, these effect sizes were collapsed following meta-analytic techniques. A thorough explanation of these steps follows:

Sample of Leaders and Subordinates. As suggested above, ratings of leaders by their subordinates were sampled from the database of Denison Consulting.

Inclusion Criteria. Two basic decision rules were followed in order to qualify leaders and their subordinates for inclusion in this study: 1) Leaders must have latitude to oversee subordinates of varying ages (i.e., younger, same age, or older) and 2) leaders must have multiple subordinates in these varying age categories. More specifically, to allow for the calculation of pooled variance terms necessary to compute

a standardized mean difference, each leader must have multiple (i.e., > 2) subordinates in at least two of the focal age categories (i.e., older, younger, the same age). These criteria were chosen to allow for a broader range of workgroups to be sampled, but also to allow for the comparison of multiple age groups (i.e., older vs. younger; older and younger vs. same age).

It is worthwhile to mention two additional criteria that were applied to facilitate testing directional and non-directional hypotheses. To test directional hypotheses, older subordinates were defined as those subordinates who report being older than their leaders; similarly, younger subordinates were defined as those subordinates who report being younger than their leader – thus, these two groups can be compared to each other to determine if directional differences exist. To test non-directional hypotheses, the ratings provided by older subordinates and younger subordinates (as defined above) were collapsed, and compared to same age subordinates (i.e., those subordinates who fall into the same age category as their leaders) – thus, these two groups can be compared to each other to determine if non-directional differences exist.

Coding Procedure. For each leader in the total sample who met the aforementioned inclusion criteria, the following variables were coded: 1) leader and subordinate age categories, 2) subordinates' ratings of leadership effectiveness, as measured by the DLDS (i.e., overall and dimension level ratings), and 3) subordinates' ratings of leadership effectiveness, as measured by the DGLES.

Computation of Effect Size Estimates. The meta-analytic strategy employed here was based on the recommendations of Hedges and Olkin (1985). Specifically, their method of combining multiple independent correlations following random effects

assumptions[1] as specified by the Dersimonian-Laird method (Dersimonian & Laird, 1986). One distinct advantage of this approach is that it allows some latitude when computing effect sizes – specifically the ability to correct for small sample bias prior to the computation of aggregate effect size estimates.

As a first step in computing effect sizes, the ratings provided for each leader by their subordinates from the appropriate age categories (i.e., older and younger; similar and dissimilar) were collapsed into means and standard deviations. These means were then converted into common effect size statistics using a set of Excel Macros developed for this study. These common statistics are as follows: Pearson-Product Moment Correlation (r_{xy}) – used to compute the sample-size weighted meta-analytic estimate (ρ_{SSW}); Hedges'-*g* (See appendix 2), a standardized effect size estimate (Hedges & Olkin, 1985) reflecting the standardized mean difference between the older and younger subordinates on their DLDS ratings (Hedges'-*g)*. Hedges'-*g,* is a form of Cohen's-*d*, which is corrected for bias due to small sample sizes – the related Cohen's-*d* statistic tends to be inflated when sample sizes are small. To facilitate Hedges and Olkin's (1985) meta-analytic procedures, this effect size estimate was converted to a correlation coefficient following formulae suggested by Hedges and Olkin (1985; See appendix 3). Because Hedges'-*g* is corrected for small sample sizes, it is used here to compute the sample-size weighted/sample size corrected meta-analytic estimate ($\rho_{SSW-SSC}$).

Furthermore, two additional effect size estimates - based upon corrections for within-group variance estimates - were calculated. Specifically, the observed standard

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[1] Recently, there has been some evidence to suggest that choosing random-effects procedures may be the best initial practice for researchers, especially when the random-effects variance component (REVC, or τ^2) is high; See Kisamore and Brannick (2008).

deviation within any subgroup analyzed here may be biased by the sample size of the group (e.g., for any given age group, standard deviation estimates may be based upon as few as two individuals). As a result, all associated variance estimates (e.g., standard deviations, pooled standard deviations, etc.) for any group in the present study may be biased by small samples as well. Furthermore, estimates of effect size that rely on variance estimates would be likewise biased with respect to sample size.

In an attempt to rectify this issue, variance-corrected (VC) correlation coefficients were calculated for each group in the current study by substituting the total-sample standard deviation estimates for the subgroup standard deviation estimates when calculating pooled variance terms. This calculation was done prior to deriving effect sizes for each group. This procedure was followed for both the sample size weighted estimates, and the sample size weighted/sample size corrected estimates described above. This process resulted in two additional meta-analytic estimates computed for each group; sample size weighted/variance corrected estimates (ρ_{SSW-VC}), and sample size weighted/sample size corrected/variance corrected estimates ($\rho_{SSW-SSC-VC}$).

Random Effects Meta-Analytic Models. As suggested, a random effects approach to meta-analysis was undertaken. The major difference between fixed and random effects approaches to meta-analysis lies in the decomposition of variance within and between studies. In a random effects analysis, the approach is to decompose the observed variance into two component parts; within-study and between-study variance. Both variance components are used when assigning weights to effect size estimates prior to aggregation. Thus, the goal of the random effects approach to meta-analysis is to take into account both sources of variance prior to arriving at meta-analytic estimates.

The mechanics behind this variance decomposition process are relatively simple. First, the total observed variance is computed, and then the within-studies variance is isolated from this. The difference between these two values is a moment-based estimate of between-study variance referred to as tau-squared (τ^2). This τ^2 is the estimate of between-study variance that represents a point estimate of the among-study variance of true effects.

Homogeneity of Effect Size Estimates. Two statistics indexing the homogeneity of effect size estimates were calculated here. The first homogeneity statistic, Q_B, (Hedges & Olkin, 1985), was calculated in order to determine whether each set of effect sizes share a common population effect size, which indicates whether or not the effect size estimates are homogeneous across leaders. The Q-statistic has a distribution that approximates that of a chi-square, with (k - 1) degrees of freedom, where k is the number of effect size estimates (Hedges & Olkin, 1985). The statistical significance of the Q_B statistic serves as evidence for the rejection of the hypothesis of homogeneity, and may indicate the presence of moderators.

The second homogeneity statistic considered was the tau-squared (τ^2), mentioned previously. Because τ^2 reflects between-study variance, it can also be interpreted as an index of heterogeneity among effect sizes. When $\tau^2 = 0.00$, there is no evidence of heterogeneity, and likewise there is no difference between the results of a random effects model and the fixed effects model. Following this logic, when τ^2 is low, there are two possibilities with regard to within versus between study variance 1) there is no variance between studies, or 2) there is variance between studies, but it is fully explained by the variance within studies. Another way to think of this scenario is that

imprecision between studies leads us to expect that effect sizes vary somewhat from one another. Therefore, the between-studies variance is low. A high τ^2 suggests that there is variance between studies that cannot be fully explained by the variance within studies. This suggests the within-study variance is minimal, and is reflected by the fact that excess variation (i.e., between-studies variance) is high – as is the value of the τ^2 estimate. Taken together, this suggests that tau-squared increases as either the variance within-studies decreases and/or the observed variance increases.

Across all analyses conducted in this study, there was no evidence for heterogeneity of effect sizes. That is to say, there were no significant Q_B's across all analyses. The result is not surprising, given that all τ^2 values were also 0.00. This finding suggests homogeneity of effect size estimates, and given the range of effect sizes observed here, is likely due to the later condition regarding low observed τ^2 values (i.e., variance between studies is fully explained by the variance within studies). Thus, although a random effects analysis strategy was employed here, a fixed effects model would have sufficiently captured these relationships. Furthermore, it should be noted that the results of a fixed effects analysis of this data would be equivalent to those presented here, and as such, the conclusions drawn from this study are unaffected by the homogeneity of effect size estimates.

Interpretation of Effect Size Magnitudes. In order to interpret the results presented here, the interpretation of the magnitude of effect size estimates (i.e., ρ_{xy} $_{(SSW)}$, ρ_{xy} $_{(SSW-SSC)}$, ρ_{xy} $_{(SSW-VC)}$, ρ_{xy} $_{(SSW-SSC-VC)}$) was based on the suggestions of Cohen (1988). Specifically, meta-analytic correlations of .10 or less are considered small, .25

are considered to be a medium effect size, and .40 or higher are considered a large effect size.

Correction for Statistical Artifacts. Hunter and Schmidt (1990) suggest that, when possible, unreliability should be accounted for in both predictors and criterion. For the current investigation, accounting for predictor (i.e., subordinate age) reliability does not make sense conceptually. Furthermore, accounting for criterion (i.e., DLDS; DGLES) reliability is also seemingly problematic. Conceivably, there are two ways in which criterion unreliability could be accounted for in the current study. The first is to calculate a reliability estimate for the DLDS within each leader-subordinate group separately, and correct for differences in reliability across leader groups. The second method is to calculate an overall reliability estimate across all leader-subordinate groups, and correct for unreliability across all groups. The former method is problematic, because reliability estimates would be based off of relatively small samples (i.e., as few as four subordinate raters), and therefore may be biased. The latter method is problematic because it would correct all effect sizes by the same amount, which is contrary to what Hunter and Schmidt (1990) suggest. Because of these issues, corrections for criterion unreliability were not undertaken in the current study.

Effect Sizes Calculated. Because of the nature of the data to be used by the current study, and the hypotheses regarding the impact of age differences on both aggregate and dimension level effectiveness ratings, effect size estimates were derived for both aggregate and dimension level DLDS scores, and on aggregate DGLES score. Thus, effect size estimates based upon subordinates' ratings reflecting each hypothesis

were calculated for (a) each DLDS dimension, (b) aggregated DLDS dimensions, and
(c) aggregated DGLES.

CHAPTER 3: RESULTS

Descriptive statistics, including means, standard deviations, reliability estimates, and correlations among study variables can be found in Table 2. Before presenting the results of the meta-analytic analyses, it is reasonable to inquire if there is any main-effect (i.e., mean level) evidence for leader-subordinate age differences on any of the dependent variables investigated here. These results are especially interesting given that other research investigating leader-subordinate relational demography has employed this type of main effect analysis paradigm (e.g., Collins, Hair, and Rocco, 2009).

To test for mean level differences, independent samples t-tests were conducted for both directional and non-directional age comparisons (i.e., collapsed across leaders) on a) the Overall Denison Leadership Development Survey (DLDS) and b) the Denison General Leadership Effectiveness survey (DGLES). To minimize the possibility of capitalizing on chance, and inflating the type I error rate due to conducting multiple simultaneous pairwise comparisons, a Bonferroni correction was applied to the interpretation of the p-value associated with each mean difference (i.e., with no correction the chance of finding one or more significant differences in 2 tests at $p < .05$ = 0.0975 or 9.75%, which exceed the standard 5% criteria for rejecting a null hypothesis). This correction recommends interpreting these comparisons at $p < .025$ (Sidak's exact adjustment for each test is $p < 0.0253$). To be more conservative, these analyses can also be interpreted at a $p < .01$, a common standard for psychological research with relatively large samples, where overpowering statistical tests for mean differences is a concern.

Considering the directional analysis of the Overall DLDS, there was no evidence for mean level differences in subordinates' ratings of their leaders between older (M = 5.79, SD = .66) and younger (M = 5.78, SD = .71) raters, t (212) = -0.183, p =0.855; 99.975% CI: (L) -0.366 (U) 0.332. Likewise, considering the non-directional analysis of the Overall DLDS there was no evidence for mean level differences in subordinates' ratings of their leaders between similar (M = 5.71, SD = .64) and dissimilar (M = 5.81, SD = .56) raters, t (556) = -1.96, p =0.051; 99.975% CI: (L) -0.286 (U) 0.088.

Considering the directional analysis of the DGLES, there was no evidence for mean level differences in subordinates' ratings of their leaders between older (M = 5.86, SD = .98) and younger (M = 5.86, SD = .97) raters, t (200) = 0.064, p =0.949; 99.975% CI: (L) -0.503 (U) 0.520. Likewise, considering the non-directional analysis of the DGLES there was no evidence for mean level differences in subordinates ratings of their leaders between similar (M = 5.92, SD = .84) and dissimilar (M = 5.98, SD = .73) raters, t (520) = -.928, p =0.354; 99.975% CI: (L) -0.318 (U) 0.190.

Furthermore, it is reasonable to inquire whether or not there are either directional or non-directional age differences on the four DLDS sub-dimensions. To test this, two MANOVA models were run, each with the four DLDS sub-dimensions as dependent variables, and dummy coded age categories (i.e., for directional 0 = Younger, 1 = Older; for non-directional 0 = Similar, 1 = Older) as the independent variables. Regarding the directional MANOVA, there was no evidence for a multivariate directional effect of age across the four DLDS dimensions $\lambda_{Wilk's}$= 0.966, F(4, 189) = 1.683, p = .156. Furthermore, there was no evidence for a multivariate non-directional effect of age across the four DLDS dimensions $\lambda_{Wilk's}$= 0.993, F(4, 525) = .892, p = .468. Collectively,

the results suggest that there are no mean-level differences in the DLDS (i.e., at the overall or dimension level) or the DGLES that can be associated with age differences (i.e., either directional or non-directional) between leaders and their subordinates.

With this in mind, we now turn our attention to a discussion of the results of the meta-analytic analyses conducted in this study. At this point it is necessary to explain the nature of the effect sizes derived for this study, particularly with regard to interpreting their directionality. For non-directional hypotheses, the "similar" age group was used as the reference group when calculating effect sizes. Thus, positive correlations indicate that similar subordinates provided higher ratings than dissimilar subordinates; likewise, negative correlations indicated that dissimilar subordinates provided higher ratings than similar subordinates. For directional hypotheses, the "younger" age group was used as the reference group when calculating effect sizes. Thus, positive correlations indicate that younger subordinates provided higher ratings than older subordinates; likewise, negative correlations indicate that older subordinates provided higher ratings than younger subordinates.

Hypothesis 1a – Non-Directional Age Differences. Non-directional age differences were tested for both the DLDS and the DGLES. Table 3 contains the results of the non-directional meta-analysis of the DLDS, and table 4 contains the non-directional meta-analysis of the DGLES. For the DLDS, $K = 279$ effect sizes were derived from $N = 1666$ subordinates. Across all effect sizes calculated (i.e., Sample Size Weighted - $\rho_{xy \text{ (SSW)}}$ = -0.079; Sample Size Weighted-Sample Size Corrected - $\rho_{xy \text{ (SSW-SSC)}}$ = -0.076; Sample Size Weighted-Variance Corrected - $\rho_{xy \text{ (SSW-VC)}}$ = -0.086; Sample Size Weighted-Sample Size Corrected-Variance Corrected - $\rho_{xy \text{ (SSW-SSC-VC)}}$ = -

0.083), there was a small, yet statistically significant (i.e., $p < 0.05$, as interpreted by 95% confidence intervals for meta-analytic estimates that do not include 0.00) main effect of non-directional age differences on ratings of leadership effectiveness.

Because these correlations are negative, the interpretation of this finding is that, in the aggregate, dissimilarly aged subordinates provided higher ratings of leadership effectiveness than similarly aged subordinates of the same leader. Recall from above that evidence for hypothesis 1a was to be garnered to the extent that the main-effect difference between the aggregated ratings provided by dissimilar subordinates and similar subordinates was observed. While it was expected that the directionality of this main effect would indicate that dissimilarly aged subordinates provide lower ratings to their leaders than similarly aged subordinates (i.e., a similarity-attraction effect), the alternative explanation of this effect seems to be evident here (i.e., a social competition effect, or perhaps an dissimilarity-attraction/similarity-unattraction effect). Specifically one might interpret this finding in light of the theory that suggests that similarly aged subordinates provide lower ratings than dissimilarly aged subordinates because of percieved social competition between themselves and their similarly aged subordinates. The theoretical and practical implications of this finding are discussed at length below.

For the DGLES, $K = 259$ effect sizes were derived from $N = 1520$ subordinates. Across all effect sizes calculated (i.e., $\rho_{xy \, (SSW)} = -0.040$; $\rho_{xy \, (SSW-SSC)} = -0.040$; $\rho_{xy \, (SSW-VC)} = -0.041$; $\rho_{xy \, (SSW-SSC-VC)} = -0.040$), there were small, non-significant (i.e., $p > 0.05$, as interpreted by 95% confidence intervals for meta-analytic estimates that include 0.00) effects of non-directional age differences on ratings of leadership effectiveness. Thus, while the direction of these relationships is consistent with the effects observed for the

DLDS, there was no evidence for statistically significant effects of non-directional age differences on the DGLES.

Hypothesis 1b – Directional Age Differences. As the alternative to hypothesis 1a, hypothesis 1b suggests that there is an overall main effect difference between the aggregated ratings provided by Status Incongruent (SIC) subordinates and those provided by Status Congruent (SC) subordinates. As evidence for this, a main effect difference between SIC and SC subordinates would need to be observed; it is hypothesized that this difference indicates that SIC subordinates provide lower ratings to their leaders than SC subordinates. However, as before, the possibility that SIC subordinated may provide ratings of their leaders than are higher than SC subordinates has been accounted for. Thus, directional age differences were tested for both the DLDS and the DGLES. Table 5 contains the results of the directional meta-analytic analysis of the DLDS, and table 6 contains the directional meta-analytic analysis of the DGLES.

For the DLDS, K= 107 effect sizes were derived from N = 559 subordinates. Across all effect sizes calculated (i.e., $\rho_{xy \, (SSW)}$ = -0.004; $\rho_{xy \, (SSW-SSC)}$ = -0.005; $\rho_{xy \, (SSW-VC)}$ = 0.015; $\rho_{xy \, (SSW-SSC-VC)}$ = 0.014), there were small, non-significant (i.e., $p > 0.05$, as interpreted by 95% confidence intervals for meta-analytic estimates that include 0.00) effects of directional age differences on ratings of leadership effectiveness. Thus, there was no evidence for statistically significant effects of directional age differences on the DLDS.

For the DGLES, K= 99 effect sizes were derived from N = 513 subordinates. Across all effect sizes calculated (i.e., $\rho_{xy \, (SSW)}$ = -0.048; $\rho_{xy \, (SSW-SSC)}$ = -0.043; $\rho_{xy \, (SSW-VC)}$

= 0.042; $\rho_{xy \; (SSW\text{-}SSC\text{-}VC)}$ = 0.040), there were small, non-significant (i.e., $p > 0.05$, as interpreted by 95% confidence intervals for meta-analytic estimates that include 0.00) effects of directional age differences on ratings of leadership effectiveness. Thus there was no evidence for statistically significant effects of directional age differences on the DLDS.

Hypotheses 2a and 2b – Stereotype Effects. The next set of competing hypotheses (hypotheses 2a and 2b) build off of hypotheses 1b. These hypotheses ask whether, in reference to SC subordinates, leader's ratings by SIC subordinates differ by DLDS dimension. If ratings differ by dimension, it is possible that a stereotype effect is occurring (H2a). However, if ratings are universally negative, this serves as evidence for a pure status incongruence effect (i.e., H2b). Evidence for these hypotheses is garnered to the extent that ratings provided by older subordinates are heterogeneous with respect to the dimensions hypothesized to differ (H2a) versus homogeneous (H2b) in comparison to those provided by younger subordinates.

Recall from above that hypothesis 1b was not supported (i.e., there was no evidence for directional age effects for the DLDS or the DGLES). However analyses by dimension are still important to consider for exploratory reasons because conceptualizing DLDS scores in the aggregate may be masking differences at the dimensional level (i.e., strong negative and positive relationships at the dimension level may cancel each other out in the aggregate). Furthermore, because support was garnered for a social competition effect in hypothesis 1a (see above) it is reasonable to inquire whether or not stereotype effects are at play in this relationship (i.e., are the

ratings by DLDS dimension for similar subordinates universally negative, or is there some evidence for moderation by dimension?).

Thus, non-directional and directional age differences were tested for each of the four dimensions of the DLDS. Table 7 contains the results of the non-directional meta-analytic analysis of the DLDS dimensions, and table 8 contains the directional meta-analytic analysis of the DLDS dimensions.

Non-Directional Age Difference by DLDS Dimension. Considering non-directional differences for the DLDS Adaptability dimension, K= 274 effect sizes were derived from N = 1631 subordinates. For all but one effect size calculated (i.e., $\rho_{xy\ (SSW-VC)}$ = -0.072, p < .05 as interpreted by a 95% confidence intervals for meta-analytic estimates that does not include 0.00), there was a small, non-significant (i.e., p > 0.05, as interpreted by 95% confidence intervals for meta-analytic estimates that include 0.00) effect of non-directional age differences on ratings of leadership effectiveness (i.e., $\rho_{xy\ (SSW)}$ = -0.063; $\rho_{xy\ (SSW-SSC)}$ = -0.059; $\rho_{xy\ (SSW-SSC-VC)}$ = -0.068).

To test non-directional differences for the DLDS Consistency dimension, K= 275 effect sizes were derived from N = 1633 subordinates. For two of the effect sizes calculated there was a small, statistically significant effect of non-directional age differences on ratings of leadership effectiveness (i.e., $\rho_{xy\ (SSW-VC)}$ = -0.077, and $\rho_{xy\ (SSW-SSC-VC)}$ = -0.074, p < .05 as interpreted by a 95% confidence intervals for meta-analytic estimates that does not include 0.00). For the other two effect sizes calculated there was a small, non-significant (i.e., p > 0.05, as interpreted by 95% confidence intervals for meta-analytic estimates that include 0.00) effect of non-directional age differences on ratings of leadership effectiveness (i.e., $\rho_{xy\ (SSW)}$ = -0.059; $\rho_{xy\ (SSW-SSC)}$ = -0.056).

For non-directional differences on the DLDS Involvement dimension, K= 278 effect sizes were derived from N = 1661 subordinates. For two of the effect sizes calculated there was a small, statistically significant effect of non-directional age differences on ratings of leadership effectiveness (i.e., $\rho_{xy \text{ (SSW-VC)}}$ = -0.079, and $\rho_{xy \text{ (SSW-SSC-VC)}}$ = -0.075, p < .05 as interpreted by a 95% confidence intervals for meta-analytic estimates that does not include 0.00). For the other two effect sizes calculated there was a small, non-significant (i.e., p > 0.05, as interpreted by 95% confidence intervals for meta-analytic estimates that include 0.00) effect of non-directional age differences on ratings of leadership effectiveness (i.e., $\rho_{xy \text{ (SSW)}}$ = -0.058 n.s.; $\rho_{xy \text{ (SSW-SSC)}}$ = -0.056 n.s.).

Finally, considering non-directional differences for the DLDS Mission dimension, K= 274 effect sizes were derived from N = 1635 subordinates. For all effect sizes calculated, there was a small, statistically significant effect of non-directional age differences on ratings of leadership effectiveness (i.e., $\rho_{xy \text{ (SSW)}}$ = -0.10; $\rho_{xy \text{ (SSW-SSC)}}$ = -0.096; $\rho_{xy \text{ (SSW-VC)}}$ = -0.010; $\rho_{xy \text{ (SSW-SSC-VC)}}$ = -0.097, p < .05 as interpreted by a 95% confidence intervals for meta-analytic estimates that does not include 0.00).

It is worthwhile to note here that there is no evidence for moderation by DLDS dimension for non-directional age differences. That is, the 95% confidence intervals for those dimensions that show significant differences between similar and dissimilarly aged subordinates ratings completely overlap (See table 7). This finding suggests that across DLDS dimensions, ratings are "universally negative," suggesting that similarly aged subordinates are not demonstrating a stereotype effect when conducting ratings, rather the pattern across dimensions may be more aptly described as a negative halo

effect (i.e., ratings are similarly lower for similarly aged subordinates, and are not statistically different from each other from dimension to dimension). This may not be surprising given that the average ages of the leaders in the sample ranged from 30 to 49, which may not be considered "young" in terms of the way stereotypes of younger individuals in the workplace operate. It is interesting to note that the strongest absolute effect across DLDS dimensions was observed for the Mission dimension (i.e., $\rho_{xy \, (SSW)}$ = -0.10; $\rho_{xy \, (SSW\text{-}SSC)}$ = -0.096; $\rho_{xy \, (SSW\text{-}VC)}$ = -0.010; $\rho_{xy \, (SSW\text{-}SSC\text{-}VC)}$ = -0.097, all p < .05); some possible explanations for this are addressed in the discussion section, below.

Directional Age Difference by DLDS Dimension. Considering directional differences for the DLDS Adaptability dimension, K= 103 effect sizes were derived from N = 531 subordinates. For all of the effect sizes calculated, there was a small, non-significant effect (i.e., p > .05 as interpreted by a 95% confidence intervals for meta-analytic estimates that includes 0.00) of directional age differences on ratings of leadership effectiveness (i.e., $\rho_{xy \, (SSW)}$ = -0.016 n.s.; $\rho_{xy \, (SSW\text{-}SSC)}$ = -0.016; $\rho_{xy \, (SSW\text{-}VC)}$ = -0.001 n.s.; $\rho_{xy \, (SSW\text{-}SSC\text{-}VC)}$ = -0.001 n.s.).

Next, to test for directional differences on the DLDS Consistency dimension, K= 106 effect sizes were derived from N = 552 subordinates. For all of the effect sizes calculated, there was a small, non-significant effect (i.e., p > .05 as interpreted by a 95% confidence intervals for meta-analytic estimates that includes 0.00) of directional age differences on ratings of leadership effectiveness (i.e., $\rho_{xy \, (SSW)}$ = -0.043 n.s.; $\rho_{xy \, (SSW\text{-}SSC)}$ = -0.039 n.s.; $\rho_{xy \, (SSW\text{-}VC)}$ = -0.016 n.s.; $\rho_{xy \, (SSW\text{-}SSC\text{-}VC)}$ = -0.013 n.s.).

In terms of directional differences for the DLDS Involvement dimension, K= 104 effect sizes were derived from N = 547 subordinates. For all of the effect sizes

calculated, there was a small, non-significant effect (i.e., p > .05 as interpreted by a 95% confidence intervals for meta-analytic estimates that includes 0.00) of directional age differences on ratings of leadership effectiveness (i.e., $\rho_{xy\ (SSW)}$ = 0.006 n.s.; $\rho_{xy\ (SSW-SSC)}$ = 0.001 n.s.; $\rho_{xy\ (SSW-VC)}$ = 0.026 n.s.; $\rho_{xy\ (SSW-SSC-VC)}$ = 0.022 n.s.).

Finally, when considering directional differences for the DLDS Mission dimension, K= 274 effect sizes were derived from N = 1635 subordinates. For all of the effect sizes calculated, there was a small, non-significant effect (i.e., p > .05 as interpreted by a 95% confidence intervals for meta-analytic estimates that includes 0.00) of directional age differences on ratings of leadership effectiveness (i.e., $\rho_{xy\ (SSW)}$ = 0.010 n.s.; $\rho_{xy\ (SSW-SSC)}$ = 0.010 n.s.; $\rho_{xy\ (SSW-VC)}$ = 0.028 n.s.; $\rho_{xy\ (SSW-SSC-VC)}$ = 0.027 n.s.).

CHAPTER 4 DISCUSSION

Summary of Findings

It now makes sense to take a closer look at the results presented above, and to discuss the broader implications of this study. Thus, the following section addresses the evidence garnered for the hypotheses presented above as they relate to the theories that support them, and then suggests some more general implications of the current investigation with regard to both theory and practice.

However, before discussing the meta-analytic results, the results of the preliminary main effect analyses must be addressed. Recall that prior to conducting meta-analytic analyses, mean-level tests of relational age differences in leadership effectiveness ratings (i.e., for the DGLES, and the DLDS – overall and dimension level) were conducted across all leaders. As suggested previously, the results of this analysis did not support the predictions specified by relational demography. That is, there were no significant mean-level directional or non-directional differences in leadership effectiveness ratings for either the DGLES or the DLDS at the overall or dimension level.   It is important to note here that if this study had adopted this traditional main effect paradigm to study these effects, an incorrect conclusion – suggesting that there is no evidence here for a relational demography effect - would have been reached. This conclusion would amount to a type II error in the parlance of null hypothesis significance testing (i.e., a failure to reject a false null hypothesis).

Turning our attention to the meta-analytic analyses, recall that the first two hypotheses (Hypotheses 1 and 2) were competing, and pitted non-directional versus directional theories of relational demography against each other. Given the competing

nature of these two hypotheses, they are discussed first. As mentioned, evidence was found in support of the relationship specified by hypothesis 1a. However, what is interesting is that the direction of this relationship does not support the theoretical notions presented by the similarity-attraction perspective. Rather the evidence presented here provides evidence for a subtle social competition effect for the DLDS. That is, the observed non-directional age difference found here (See table 3) suggests that subordinates who are the same age as their leaders provide lower ratings of leadership effectiveness than subordinates who are older or younger than their leaders. This effect was reflected in both the overall and dimension level ratings. Furthermore, it is interesting to note that, while non-significant, the direction of the meta-analytic effect sizes observed for the DLGS were consistent with this prediction, which may suggest a trend favoring a social competition effect for this outcome as well.

Given evidence for hypothesis 1a, it is not surprising that hypothesis 1b was not supported. That is, within the current investigation, there was no evidence for the theoretical notion of status congruence; an observed directional main effect difference was not observed, suggesting that the ratings provided by SIC and SC subordinates did not differ systematically. Furthermore, no evidence was found to support the alternative explanation (i.e., loyalty and commitment effect).

Taking a closer look at the collective evidence presented for hypotheses 1a and 1b, it is worthwhile here to consider why evidence was found for non-directional age effects, and not found for directional age effects. One argument that supports evidence for the observed non-directional social competition effect presented here, in lieu of the other hypothesized explanations, can be drawn from an examination of the present

study in relation to past work in this area. That is, the meta-analytic framework adopted here represents the best attempt at addressing some methodological concerns inherent in studying relational demography from the perspective of subordinate ratings of leader effectiveness. As such, one could argue that this investigation presents the most rigorous test of these effects to date. Thus, given that the cumulative results of past studies of this phenomenon have been largely equivocal with regard to the directionality of relational demography effects, and given the evidence presented here, it would appear that non-directional social competition effects seems to provide the most compelling case for this type of relational demography.

Comparing the two competing hypotheses specified by hypothesis 1a and hypothesis 1b, it is reasonable to conclude that there is evidence to support a non-directional social competition effect. More specifically, this effect suggests that within workgroups with heterogeneous subordinate age distributions, subordinates who are of a similar age as their leaders provide systematically lower ratings of leadership effectiveness than subordinates who are younger and older than their leaders. It is worthwhile here to note, that across the four classes of meta-analytic effect sizes calculated here (i.e., $\rho_{xy\ (SSW)}$ = sample size weighted; $\rho_{xy\ (SSW-SSC)}$ = sample size weighted and sample size corrected; $\rho_{xy\ (SSW-VC)}$ = sample size weighted and variance corrected; $\rho_{xy\ (SSW-SSC-VC)}$ = sample size weighed, sample size corrected, and variance corrected meta-analytic correlation) the absolute magnitude of this effect was quite small, accounting for between 0.0058% and 0.0074% of the variance in leadership effectiveness ratings. While this is addressed further below, it is important to note that this effect is unique among studies that have investigated relational demography from

the perspective of leader-subordinate age differences and ratings of the effectiveness of their leaders (e.g., Vecchio, 1993; Collins, Hair, and Rocco, 2009), and as such provides an interesting contribution to this literature.

The theory underlying the next set of competing hypotheses (i.e., hypothesis 2a and hypothesis 2b) builds off the assumption of support for hypothesis 1b. Specifically, hypothesis 2a is rooted in the notion that stereotypes associated with younger individuals in leadership roles may manifest as exacerbated status incongruence effects at the dimension level of the DLDS. Specifically, this hypothesis suggests that the ratings provided by older subordinates (i.e., versus younger subordinates) may differ when considering certain dimensions of the DLDS. Contrary to this, Hypothesis 1b suggests that there are not differences between younger and older subordinates at the dimension level of the DLDS, thus there is evidence for a pure status congruence effect (i.e., no difference in ratings by DLDS dimension).

However, because evidence was garnered for Hypothesis 1a, and not for 1b, one would not necessarily expect differences by DLDS dimension to emerge. However, as suggested, it is possible that opposing strong negative and positive effects of status incongruence at the dimension level may mask true differences on these dimensions when considered in the aggregate. Thus, the analysis of DLDS dimension-level differences between status congruent and status incongruent subordinates was carried out to test this. Furthermore, a similar analysis was carried out for the non-directional groups (i.e., similar vs. dissimilar) for exploratory purposes.

As suggested above, there is some evidence to suggest that there are non-directional differences by DLDS dimension (See table 7); however, there were no

dimension level differences for the directional comparisons (See table 8). Despite evidence for significant dimension-level non-directional effects for the DLDS, there is no evidence here to suggest moderation by dimension level (e.g., considering the sample size weighed, variance corrected meta analytic correlation coefficients, the confidence intervals completely overlap across the four DLDS dimensions). Despite a lack of evidence for moderation by dimensions, it is interesting to note that the strongest effect of non-directional age differences observed here was for the mission dimension (See table 7). These estimates range from $\rho_{xy\ (SSW-SSC)}$ = -0.096 to $\rho_{xy\ (SSW)}$ = -0.100, suggesting that between 0.009% ad 0.01% of the variance in leadership effectiveness ratings for the mission dimension of the DLDS can be attributed to non-directional age differences between subordinates.

There are several possible explanations for why similarly aged subordinates rate their leaders lower on the mission dimension. From a organizational age grading perspective (e.g., Lawrence, 1984) it may be that in comparing one's own career progress to a similarly aged leader, a subordinate may see his or her leader's progression through the ranks as a violation of organizational norms for career progress. This norm may be particularly tied to either the explicit or implied mission of the organization, particularly if career trajectories typically follow a formalized process or commonly accepted pattern, and can have a distinct impact on organizational behavior. For example, there is some evidence that matching individual and organizational career plans can impact job satisfaction, and organizational commitment (Granrose & Portwood, 1987). As a result of this apparent mismatch between the organization's mission and the formal application of this mission through policies and procedures,

perceptions of lower mission orientation may be reflected in subordinates' evaluation of their similarly aged leader.

Another possibility is the presence of intragenerational stereotypes. While research has shown that younger individuals are perceived as less mission-oriented, (e.g., Smith, 2008), it may be that within the same age cohort, there are different perceptions of various work-related attributes, and indeed different standards for the evaluation of similar others through a self-stereotyping process. From a social comparison perspective (e.g., Festinger, 1954) there is some evidence that within age cohorts, age stereotypes can serve as a reference standard for self-enhancing comparisons (Rothermund & Brandtstädter, 2003). Furthermore, this effect may be exacerbated by the power differential inherent in subordinate-leader relationships.

Interestingly, despite evidence for non-directional social competition age effects on DLDS at both the aggregate and dimension levels, evidence was not garnered for similar effects on the DGLES. Indeed, while the direction of this effect was similar, it was not significantly different than zero. This might suggest the prospect that one overriding process does not influence these two dependent variables in the same fashion, but instead that different processes may influence the different outcome measures. Indeed, as discussed below, further research into the demographic composition of workgroups may help to further our understanding of these effects.

Small Effects and Practical Significance. Based upon the results presented here, one could conclude that while there is some evidence to suggest that non-directional age differences between leaders and their subordinates can subtly impact the evaluation of leadership effectiveness, the impact of this difference is quite small.

These conclusions beg the question of the practical significance of small effects in performance rating research. That is to say, should we realistically care about small differences in performance ratings that can be attributed to demographic differences between leaders and their subordinates?

From one perspective, it is impressive to note that subtle differences in the construction of comparison groups (i.e., similarly aged vs. dissimilarly aged) can manifest themselves as observable differences in leadership effectiveness ratings. In this vein, Prentice and Miller (1992) suggest that beyond the amount of variance explained by an independent variable, minimal manipulations of independent variables that result in any systematic variance in a dependent variable are remarkable, and noteworthy. The argument here is that the size of an effect depends not just on the relationship between the independent and dependent variables, but also on the operationalizations that underscore the generation of this data. As Prentice and Miller, (1992) suggest, studies such as the present investigation that are not designed to account for a lot of variance, are no less impressive for the statistical size of the effects that are found (p. 163).

A similar idea is echoed by Abelson (1985), in a classic treatise on the importance of considering the cumulative effects of small amounts of explainable variance:

"The message here is that it is the *process* through which variables operate in the real world that is important. In the present context, the attitude toward explained variance ought to be conditional on the degree to which the effects of the explanatory factor cumulate in practice." (p. 133)

Abelson (1985) suggests that a common example of a potentially cumulative process in which small differences matter are situations in which repeated decisions are conducted by similar policy makers. The implication of differences in such decisions are, by themselves, small. However, these small variance contributions may grossly understate the variance contribution in the long run. Thus, what may seem like a trivial amount of variance when considered in a cross sectional manner, may meaningfully manifest over time in other high stakes decisions. That is to say, because performance appraisals often play a key role in a number of superordinate evaluative workplace outcomes, such as promotion, salary, and tenure decisions, any degree of systematic, invalid variance in such judgments is worthwhile to note, and attempt to account for.

This notion suggests that the effects observed herein are indeed meaningful, and have both theoretical (i.e., the social competition effect presented here is novel in the relational demography literature), and practical (i.e., subtle age effects may underlie small, yet meaningful systematic differences in workplace performance appraisals) implications. Overall, the results presented here suggest that non-directional age differences between leaders and their subordinates can provide a unique – albeit small – source of systematic variance in leadership effectiveness ratings.

Limitations and Directions for Future Research.

While this study has presented compelling evidence for a unique way in which leader and subordinate age differences may impact the way in which subordinates rate the effectiveness of their leaders, no study is without some limitations. One obvious limitation of the present study is the way in which leader and subordinate age was operationalized. Specifically, the age groups used here were categorical. Because the

data used here was archival, it was not possible to obtain actual continuous (i.e., age in years) reports of leader and subordinate ages.

Because the age groups used were categorical, there was a wide range of ages that were considered to be equal in the analyses presented here. Furthermore, one might argue that actual age differences in workgroups may not be known by all workgroup members, and that what is more likely is for the perception of age differences to be present. Thus, it is reasonable to assume that the effects reported here are conservative estimates of the effect that might be observed if age differences could be conceptualized with more precision, or if actual age differences were made salient. Despite this limitation, statistically significant, and arguably meaningful effects were observed here.

A major assumption of the current study is that observed relational age differences in leadership effectiveness ratings are attributable to systematically lower ratings being assigned by specific target age groups. In this case, there is evidence that similarly aged subordinates provide lower ratings to their leaders than dissimilarly aged subordinates. However, this assumption may ignore the accuracy of the ratings being assigned. For example, this observed effect might reflect dissimilarly aged subordinates providing systematically higher ratings than similarly aged subordinates. Without an index of rating accuracy, it is difficult to tease apart this effect. However, it is very important to note that ultimately, theory drives the justification for the directionality of the effects presented here.

Indeed, there is a preponderance of support from past research and theory to suggest a social competition explanation for the results presented in this study.

Additionally, many would argue that in practice, performance rating accuracy is perhaps less important than the ability to identify sources of systematic variation in performance ratings (e.g., stereotype endorsement, Baltes, Bauer & Frensch, 2007).

Another possible limitation of this study is the use of an essentially cross sectional design. That is to say, this study relied on archival survey data, which was collected at one time-point from a number of leaders and their subordinates. This type of design does not allow for as much precision, as potentially important confounding factors (e.g., other demographic variables, task-specific factors, level of social interaction) cannot be held constant – nor measured and accounted for - across workgroups. It would be interesting to devise a more naturalistic field experiment, in which team or workgroup demographic composition variables (i.e., age) were manipulated, and various individual and team level process variables were examined as a function of these purposeful variations in this composition.

One might also cite the possibility that systematic inflation of ratings by raters - often referred to as leniency bias - may be at play here. Indeed, these types of rater effects have been noted as possible sources of attenuation with regards to the inferences drawn from performance measures (Holzbach, 1978). Therefore, it is worthwhile to consider the possibility that rater inaccuracy may affect the results presented here which may suggest that the effects observed herein may be attenuated. Furthermore, one might posit that the purpose of the ratings being conducted here may influence rater accuracy. That is, there is some evidence to suggest that ratings conducted for administrative purposes are susceptible to rating inflation in the form of leniency.

To this end, there was no evidence for restricted range on the dependent variables considered here. Furthermore, a substantial body of research suggests that subordinate ratings, conducted for developmental purposes, are fairly robust to the effects of leniency (i.e., ratings conducted for developmental properties are generally less susceptible to rating errors than ratings conducted for administrative purposes, See Greguras, Robie, Schleicher, & Goff, 2003; Harris, Smith, & Champagne, 2006). Given that the ratings collected here were largely developmental in nature, rater inaccuracy is probably not of principle concern here.

Another limitation of the current study is the focus on one source of demographic similarity, namely age. Indeed, other demographic characteristics need to be considered in future studies of this phenomenon to gain a more holistic picture of the nature of relational demography. However, one strength of the current study is the ability to independently model the influence of age differences between leaders and subordinates. Thus, while the focus of the current study may seem narrow, particularly in comparison to the other possible demographic characteristics that may impact leader-subordinate relationships, this narrow focus allows for a deep understanding of the role that age differences play in this context.

One demographic characteristic that begs for future research with regard to age is organizational tenure. Indeed, one might posit that the effects presented here with respect to age differences between leaders and their subordinates may be impacted by the relative length of leader and subordinate tenure. That is, if a subordinate is the same age as their leader, but has had a longer period of tenure with their organization than their leader, one might expect the effects of social comparison to be exacerbated,

and reflected in performance evaluations. Specifically, a subordinate in this situation may be particularly aware of their standing and career progression within their organization, and may perceive increased threat from a similarly aged leader, in a legitimate position of power over them, with a shorter tenure.

Furthermore, it may be interesting to consider the influence of career transition variables on relational demography effects. That is, it would be interesting to see if the effects suggested to exist here operate differently for individuals who have recently transitioned into a new career, or into a new organization. Because career transitions are often accompanied by a corresponding psychological adjustment process (Latack, 1983), the process of social comparisons and the impact of perceived organizational age norms might affect transitioning individuals differently than individuals who have longstanding tenure and career tracks. Thus, this population would be particularly interesting to study in this type of demography framework.

Finally, one might cite that the present study relied on a convenience sample. That is, the workgroups that were sampled from a single database (i.e., Denison Consulting) on the basis of the aforementioned criteria (i.e., heterogeneous age distributions). Ideally, this data would have been sampled more broadly, however it is worthwhile to note that despite the use of a convenience sample, this sample does have desirable characteristics, particularly when compared to past studies of this phenomenon. For example, Vecchio (1993) relied on a sample of principals and teachers - a factor that is noted as a limit to the generalizeability of this research (p. See Vecchio, 1993 p. 117).

Thus, from an external validity standpoint the use of actual organizational data in the present study should bolster the concerns of sample characteristics limiting inferences of the generalizeability of the findings presented here. Furthermore, as suggested, other studies of this phenomenon have utilized samples of working adults (i.e., Collins, Hair, & Rocco, 1999), but have failed to consider the workgroup as a whole. Thus, another distinct advantage of the sample used here, which trumps concerns regarding the use of a convenience sample, is the ability to account for workgroup and leader characteristics when testing for relational demography effects.

Implications.

The results of this study have implications for both research and practice. In terms of relational demography research, this study suggests that investigations of age differences that emphasize directional effects may be insufficient for capturing meaningful relational age differences. Indeed, the evidence presented here suggests that non-directional effects should be modeled when considering age differences between leaders and their subordinates, and the effect of such differences on performances outcomes. Thus, as demonstrated here, considering only directional age differences may be insufficient to capture real relational age effects on performance ratings that manifest as non-directional age differences.

Furthermore, from a methodological standpoint, this study demonstrates the need to apply more sophisticated methods for demonstrating the effects that are predicted to occur as a result of relational demography processes. Because much of the theory that predicts relational demography effects specifies such effects for the entire workgroup, the meta-analytic strategy presented here represents a novel

approach to the study of this phenomenon that better approximates the processes specified by these theories. By employing these methods for studying relational demography, one can begin to more effectively take into account those subtle yet meaningful differences between workgroups that occur as a function of age differences between leaders and their followers. It should again be noted that the results of the mean-level analyses conducted in the current study would lead to an incorrect conclusion regarding the presence of age-related relational demography effects under the traditional paradigm.

At a broader level, the conceptualization of age differences between leaders and their subordinates used here points to an interesting quality of age as a demographic variable. Other commonly studied demographic variables in relational demography research have inherently clear-cut operationalizations. That is, variables such as sex, and, to an extent, race, represent distinct and directly comparable categories. The continuous nature of age allows for more variety in the construction of relational categories, and as such is subject to multiple possible operationalizations. As suggested previously, the ability to model continuous age differences between leaders and their subordinates is an important, and unstudied area for future relational demography research.

In terms of the applied implications of this investigation, there are two opposing interpretations of the results presented here that warrant consideration. The first of these interpretations suggests that relational age effects in leadership effectiveness ratings, while apparent, are small, and not a true concern for organizations. The second interpretation suggests that organizations should be concerned about subtle relational

age differences in leadership effectiveness ratings, and that steps should be taken to mitigate such differences when considering workplace performance judgments.

To the first point, recall that small effects can represent a cumulative process that may multiply when considered over time, and in the aggregate. Furthermore, from a fairness perspective, any degree of systematic variance in workplace decisions that potentiates disadvantage, however small, is worthwhile to note. To the second, and arguably more valid point, while this effect is present, there is strong evidence from research concerning improving the accuracy of performance ratings that minimal efforts at reducing this effect may be quite effective. Thus, minor interventions aimed at improving the quality of performance ratings may have distinct implications for these results.

Considering the implications of this study further, the results presented here suggest a need for organizations to more carefully examine the nature of performance ratings before combining scores provided by multiple subordinates of differing ages. More specifically, aggregating performance ratings between similarly and dissimilarly aged groups may mask subtle differences that may unduly affect performance judgments. At the very least, this study suggests that organizations should be aware of the likelihood for such differences to occur, and should account for this possibility. One way for organizations to account for such age differences would be to control for rater age when aggregating performance ratings. Furthermore, controlling for rater age may also be necessary when linking performance dimensions to various outcomes for leaders. This idea further highlights the notion that rater characteristics are key to

developing a holistic understanding of the performance evaluation process (e.g., Bernardin & Beatty, 1987, Murphy & Cleveland, 1995).

At a more specific level, the results of this study have interesting implications for the methods and processes by which organizations design workgroups. Indeed, it may be that taking age similarity and organizational age norms into account when designing teams can aid in the formation of more effective workgroups. Along similar lines, organizational efforts aimed at succession planning, and ensuring a talent pipeline that moves individuals through various roles that are sensitive to organizational age norms may serve to mitigate some of the effects found here. It is important to note at this point that the current study investigates only one potential manifestation of this phenomenon – specifically with regard to ratings of leadership effectiveness. One might also posit that the effect presented here may impact job attitudes and withdrawal behaviors that have been linked to important organizational outcomes.

Finally, considering the study of age in the workplace in general, this study serves as a reminder of the complexities inherent in understanding how age can influence behavior at various stages of one's career progression. While a great deal of research has addressed how workers construct meaning at work (e.g., Baltes, Rudolph, & Bal, in press), and we know a great deal about age at work in general, we have only begun to scratch the surface of the complex social processes that underlie intergenerational and intragenerational exchanges in the workplace. This investigation should serve as a call for more in depth investigations into these phenomena, and as a model for the methodological rigor necessary to understand the complexities of these processes.

Table 1.

Distribution of Leader and Subordinate Ages Across Organizations.

	< 20	20-29	30-39	40-49	50-59	> 60	Total
			Age Category				
Leaders	0	15	215	214	5	0	449
Subordinates	7	244	726	787	662	76	2502
Total	7	259	941	1001	667	76	2951

Table 2.

Means, Standard Deviations, Reliability Estimates, and Correlations Among Study Variables.

	Mean	SD	1.	2.	3.	4.	5.	6.
1. DGLES Overall	5.909	1.130	0.950					
2. DLDS Overall	5.757	0.844	0.845	0.990				
3. DLDS Adaptability	5.818	0.825	0.797	0.944	0.961			
4. DLDS Consistency	5.782	0.856	0.813	0.952	0.874	0.964		
5. DLDS Involvement	5.732	0.933	0.810	0.948	0.843	0.887	0.968	
6. DLDS Mission	5.702	0.934	0.795	0.946	0.871	0.851	0.856	0.974

Note: DGLES = Denison General Leadership Effectiveness Survey; DLDS = Denision Leadership Development Survey. All correlations are significant at $p < .05$. α listed in diagonal.

Table 3.

Dennison Leadership Development Survey (DLDS) Non - Directional Hypothesis Results.

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	-0.079	-0.147		-0.011	5.239 (p =.022)	K= 279	N = 1666
SSW-SSC	-0.076	-0.144		-0.008	4.845 (p =.028)		
SSW-VC	-0.086	-0.153		-0.018	6.157 (p =.013)	K= 279	N = 1666
SSW-SSC-VC	-0.083	-0.150		-0.015	5.681 (p =.017)		

Note: All estimates derived by Hedges and Olkin (1985) random effects method, assuming a random effects model (Dersimonian-Laird Method). Meta-analytic estimate notation: $\rho_{xy\ (SSW)}$ = sample size weighted; $\rho_{xy\ (SSW-SSC)}$ = sample size weighted and sample size corrected; $\rho_{xy\ (SSW-VC)}$ = sample size weighted and variance corrected; $\rho_{xy\ (SSW-SSC-VC)}$ = sample size weighed, sample size corrected, and variance corrected meta-analytic correlation. $\chi^2_{association}$ tests the null hypothesis of no association.

Table 4.

Denison General Leadership Effectiveness Survey (DGLES) Non- Directional Hypothesis Results.

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	-0.040	-0.111		0.032	1.181 (p = .277)	K= 259	N = 1520
SSW-SSC	-0.040	-0.112		0.031	1.215 (p = .220)		
SSW-VC	-0.041	-0.112		0.031	1.231 (p = .267)	K = 260	N = 1525
SSW-SSC-VC	-0.040	-0.112		0.031	1.214 (p = .271)		

Note: All estimates derived by Hedges and Olkin (1985) random effects method, assuming a random effects model (Dersimonian-Laird Method). Meta-analytic estimate notation: $\rho_{xy\ (SSW)}$ = sample size weighted; $\rho_{xy\ (SSW-SSC)}$ = sample size weighted and sample size corrected; $\rho_{xy\ (SSW-VC)}$ = sample size weighted and variance corrected; $\rho_{xy\ (SSW-SSC-VC)}$ = sample size weighed, sample size corrected, and variance corrected meta-analytic correlation. $\chi^2_{association}$ tests the null hypothesis of no association.

Table 5.

Denison Leadership Development Survey (DLDS) Directional Hypothesis Results.

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	-0.004	-0.130		0.123	.0033 (p = .954)	K= 107	N = 559
SSW-SSC	-0.005	-0.131		0.122	.0051 (p = .943)		
SSW-VC	0.015	-0.111		0.141	.0549 (p = .815)	K = 107	N = 559
SSW-SSC-VC	0.014	-0.113		0.140	.0462 (p = .830)		

Note: All estimates derived by Hedges and Olkin (1985) random effects method, assuming a random effects model (Dersimonian-Laird Method). Meta-analytic estimate notation: $\rho_{xy\ (SSW)}$ = sample size weighted; $\rho_{xy\ (SSW-SSC)}$ = sample size weighted and sample size corrected; $\rho_{xy\ (SSW-VC)}$ = sample size weighted and variance corrected; $\rho_{xy\ (SSW-SSC-VC)}$ = sample size weighed, sample size corrected, and variance corrected meta-analytic correlation. $\chi^2_{association}$ tests the null hypothesis of no association.

Table 6.

Denison General Leadership Effectiveness Survey (DGLES) Directional Hypothesis Results.

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	0.048	-0.085		0.179	0.489 (p = .480)	K= 99	N = 513
SSW-SSC	0.043	-0.090		0.174	0.398 (p = .528)		
SSW-VC	0.042	-0.090		0.173	0.390 (p = .533)	K = 101	N = 521
SSW-SSC-VC	0.040	-0.092		0.171	0.352 (p = .553)		

Note: All estimates derived by Hedges and Olkin (1985) random effects method, assuming a random effects model (Dersimonian-Laird Method). Meta-analytic estimate notation: $\rho_{xy\,(SSW)}$ = sample size weighted; $\rho_{xy\,(SSW-SSC)}$ = sample size weighted and sample size corrected; $\rho_{xy\,(SSW-VC)}$ = sample size weighted and variance corrected; $\rho_{xy\,(SSW-SSC-VC)}$ = sample size weighed, sample size corrected, and variance corrected meta-analytic correlation. $\chi^2_{association}$ tests the null hypothesis of no association.

Table 7.

Denison Leadership Development Survey (DLDS) Dimension Level Non - Directional Hypothesis Results.

Adaptability

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	-0.063	-0.131		0.006	3.204 (p = .074)	K= 274	N = 1631
SSW-SSC	-0.059	-0.128		0.009	2.863 (p = .091)		
SSW-VC	-0.072	-0.140		-0.003	4.155 (p = .042)	K = 274	N = 1631
SSW-SSC-VC	-0.068	-0.136		0.001	3.715 (p = .054)		

Consistency

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	-0.059	-0.127		0.010	2.805 (p = .094)	K= 275	N = 1633
SSW-SSC	-0.056	-0.125		0.013	2.566 (p = .109)		
SSW-VC	-0.077	-0.146		-0.009	4.867 (p = .027)	K = 275	N = 1633
SSW-SSC-VC	-0.074	-0.142		-0.005	4.409 (p = .036)		

Involvement

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	-0.058	-0.126		0.010	2.820 (p = .093)	K= 278	N = 1661
SSW-SSC	-0.056	-0.123		0.013	2.560 (p = .110)		
SSW-VC	-0.079	-0.146		-0.011	5.167 (p = .023)	K = 278	N =1661
SSW-SSC-VC	-0.075	-0.143		-0.007	4.693 (p = .030)		

Mission

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	-0.100	-0.167		-0.031	8.143 (p = .004)	K= 274	N = 1635
SSW-SSC	-0.096	-0.164		-0.028	7.574 (p = .006)		
SSW-VC	-0.100	-0.168		-0.032	8.188 (p = .004)	K = 274	N = 1635
SSW-SSC-VC	-0.097	-0.164		-0.028	7.676 (p = .006)		

Note: All estimates derived by Hedges and Olkin (1985) random effects method, assuming a random effects model (Dersimonian-Laird Method). Meta-analytic estimate notation: $\rho_{xy\ (SSW)}$ = sample size weighted; $\rho_{xy\ (SSW-SSC)}$ = sample size weighted and sample size corrected; $\rho_{xy\ (SSW-VC)}$ = sample size weighted and variance corrected; $\rho_{xy\ (SSW-SSC-VC)}$ = sample size weighed, sample size corrected, and variance corrected meta-analytic correlation. $\chi^2_{association}$ tests the null hypothesis of no association.

Table 8.

Denison Leadership Development Survey (DLDS) Dimension Level Directional Hypothesis Results.

Adaptability

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	-0.016	-0.146		0.114	0.0580 (p = .810)	K= 103	N = 531
SSW-SSC	-0.016	-0.145		0.115	0.0550 (p = .815)		
SSW-VC	-0.001	-0.131		0.139	0.0002 (p = .988)	K = 102	N = 531
SSW-SSC-VC	-0.001	-0.131		0.129	0.0003 (p = .986)		

Consistency

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	-0.043	-0.170		0.085	0.4380 (p = .508)	K= 106	N = 552
SSW-SSC	-0.039	-0.166		0.089	0.3580 (p = .550)		
SSW-VC	-0.016	-0.143		0.112	0.0566 (p = .812)	K = 106	N = 552
SSW-SSC-VC	-0.013	-0.140		0.115	0.0378 (p = .846)		

Involvement

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	0.006	-0.122		0.133	0.0073 (p = .932)	K= 104	N = 547
SSW-SSC	0.001	-0.126		0.128	0.0001 (p = .991)		
SSW-VC	0.026	-0.102		0.153	0.1589 (p = .690)	K = 104	N = 547
SSW-SSC-VC	0.022	-0.106		0.149	0.1121 (p = .738)		

Mission

	ρ_{xy}	L	95% CI	U	$\chi^2_{association}$		
SSW	0.010	-0.118		0.138	0.0248 (p = .875)	K= 105	N = 547
SSW-SSC	0.010	-0.119		0.137	0.0214 (p = .884)		
SSW-VC	0.028	-0.100		0.156	0.1856 (p = .667)	K = 105	N = 547
SSW-SSC-VC	0.027	-0.101		0.154	0.1672 (p = .683)		

Note: All estimates derived by Hedges and Olkin (1985) random effects method, assuming a random effects model (Dersimonian-Laird Method). Meta-analytic estimate notation: $\rho_{xy\ (SSW)}$ = sample size weighted; $\rho_{xy\ (SSW-SSC)}$ = sample size weighted and sample size corrected; $\rho_{xy\ (SSW-VC)}$ = sample size weighted and variance corrected; $\rho_{xy\ (SSW-SSC-VC)}$ = sample size weighed, sample size corrected, and variance corrected meta-analytic correlation. $\chi^2_{association}$ tests the null hypothesis of no association.

Figure 1.

Denison Leadership Development Model.

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APPENDIX 1

Denison Leadership Development Survey (DLDS): Items by Index and Trait.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Agree	Strongly Agree

Trait Index Item: Involvement

Empowers People
1. Sees that decisions are made at the lowest possible level.
2. Shares information so that everyone gets the information s/he needs.
3. Creates an environment where everyone feels that his/her effort can make a difference.
4. Involves everyone in shaping the plans and decisions that affect them.
5. Ensures that the necessary resources are available to do the job.
6. Conveys confidence in people's competence to do their job.
7. Encourages others to take responsibility.
8. Delegates authority so that others can do their work more effectively.

Builds Team Orientation
9. Builds effective teams that get the job done.
10. Encourages effective teamwork by others.
11. Knows how to use a team approach to solve problems.
12. Knows when to use a team approach to solve problems.
13. Fosters teamwork within the work unit.
14. Knows how to design work so that it can be done by a team.
15. Values the contributions of the people s/he works with.
16. Acknowledges and celebrates team accomplishments.
 Develops

Organizational Capability
17. Builds the capabilities of employees into an important source for competitive advantage.
18. Knows how to utilize the diversity of the workforce.
19. Coaches others in the development of their skills.
20. Is sensitive and responsive to diversity issues when dealing with others.
21. Helps subordinates create realistic development plans and create opportunities for them.
22. Uses rewards and recognition to motivate good performance.
23. Develops his/her own people so that they are ready for promotion.
24. Builds employee skills so that the organization always has good "bench strength".

Trait Index Item: Consistency

Defines Core Values
25. Does the "right thing" even when it is not popular.
26. "Practices" what s/he "preaches".
27. Has an ethical code that guides his/her behavior.
28. Helps define the organization's culture, values, and ethical standards.
29. Helps employees learn to apply the organization's values when dealing with others.
30. Lives up to promises and commitments.
31. Has earned the confidence and trust of others.
32. Clearly articulates a set of fundamental beliefs that are not negotiable.

Works to Reach Agreement
33. Helps people to reach consensus, even on difficult issues.
34. Works to find alternatives that will benefit all when confronted with a disagreement.
35. Helps people in his/her organization be effective at reaching agreement on key issues.
36. Incorporates diverse points of view when making decisions.
37. Promotes constructive discussion among people with conflicting ideas.
38. Is willing to compromise when necessary in order to reach agreement.
39. Works toward win/win solutions when disagreements occur.
40. Reconciles differences by seeking to clarify and understand other's points of view.

Manages Coordination and Integration
41. Works hard to foster the alignment of goals across all functional areas.
42. Builds coordination across departmental boundaries.
43. Uses informal networks to get things done.
44. Builds relationships with key people in other functions and levels.
45. Helps create an environment that facilitates coordination of projects across functional units.
46. Makes certain that things do not "fall between the cracks".
47. Builds support for ideas through contracts with other departments.
48. Establishes mechanisms that facilitate effective cross-functional communication.

Trait Index Item: <u>Adaptability</u>

Creates Change
49. Continuously looks for new and better ways to do work.
50. Encourages creative thinking.
51. Challenges the way that things have always been done and looks for a better way.
52. Champions change that goes beyond the scope of his/her job.
53. Challenges organizational practices that are nonproductive.
54. Foresees problems before they arise.
55. Serves as a model that creates change in other parts of the organization.
56. Generates innovative ideas and solutions to problems.

Emphasizes Customer Focus
57. Encourages direct contact with customers.
58. Responds quickly and effectively to customer feedback.
59. Ensures that employees have a deep understanding of customer wants and needs.
60. Uses customer comments and recommendations to change organizational practices.
61. Actively seeks feedback from customers.
62. Continuously tries to improve service to customers.
63. Incorporates customer input into the planning process.
64. Recognizes the need to respond quickly to customer concerns.

Promotes Organizational Learning
65. Deals constructively with failures and mistakes.
66. Views failures as an opportunity for learning and improvement.
67. Creates a working environment in which learning is an important objective.
68. Openly accepts criticism without being defensive.
69. Works well under conditions of ambiguity and uncertainty.
70. Knows the strengths and weaknesses of the competition.
71. Encourages others to learn about the best practices in the industry.
72. Helps others to understand "the big picture".

Trait Index Item: <u>Mission</u>

Defines Strategic Direction & Intent
73. Provides employees with a clear mission that gives meaning and direction to their work.
74. Implements strategies by developing clear goals, objectives, and tactics.

75. Focuses on long-term strategies, rather than quick fix "band-aid" solutions.
76. Effectively allocates resources in line with strategic priorities.
77. Helps define strategies and tactics that keep his/her organization competitive.
78. Has a clear strategy for the future of his/her own part of the organization.
79. Is able to meet short-term demands without losing sight of the long-term strategy.
80. Communicates a clear and compelling rationale for the business strategy.

Defines Goals & Objectives
81. Sets clear goals that are ambitious, but realistic.
82. Holds individuals and teams accountable for achieving goals and objectives.
83. Provides clear directions and priorities for employees.
84. Establishes high standards of performance.
85. Involves employees in the goal-setting process so goals and objectives are understood and shared.
86. Tracks progress against stated goals.
87. Effectively communicates the goals and objectives of the organization.
88. Aligns goals and objectives with the strategy and vision.

Creates Shared Vision
89. Helps create a shared vision of what this organization will be like in the future.
90. Communicates the organizational vision to his/her employees.
91. Uses the vision to create excitement and motivation for employees.
92. Realizes short-term goals without compromising long-term vision.
93. Organizes work so that everyone sees the connection between the vision and daily activities.
94. Translates the vision into reality in a way that helps guide individual action.
95. Inspires others with his/her vision of the future.
96. Engages others in ways that ensure buy-in and commitment.

Note: for "other" ratings, raters' survey item starts with "This person…"

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APPENDIX 2

Meta-analytic formulae – Hedge's *g*.

$$\text{Hedges' } \hat{g} = \underbrace{\frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1-1)SD_1^2 + (n_2-1)SD_2^2}{(N_{\text{total}}-2)}}}}_{\text{Cohen's d}} \times \underbrace{\left(1 - \frac{3}{4(n_1+n_2)-9}\right)}_{\text{Adjustment for small sample}}.$$

APPENDIX 3

Meta-analytic formulae – Hedge's *g* to *r*.

$$r = \sqrt{\frac{g^2 n_e n_c}{g^2 n_e n_c + (n_e + n_c)(n_e + n_c - 2)}}.$$

APPENDIX 4

Denison General Leadership Effectiveness Survey (DGLES) Items.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Disagree	Neither Agree Nor Disagree	Slightly Agree	Agree	Strongly Agree

1. Overall, this individual is a highly effective leader
2. This individual's leadership style serves as a role model for others in the organization
3. This individual has great potential as a future leader in our organization
4. Overall, this individual is one of the most capable leaders in our organization
5. This individual develops high quality relationships with internal and external customers
6. This individual and his/her organization are consistently high performers
7. This individual is capable of leading the organization through future changes and transitions.

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ABSTRACT

A META-ANALYTIC FRAMEWORK FOR UNDERSTANDING HOW LEADER-SUBORDINATE AGE DIFFERENCES IMPACT LEADERSHIP EFFECTIVENESS RATINGS: A NOVEL APPROACH TO RELATIONAL DEMOGRAPHY

by

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Recently, there has been renewed interest in studying relational demography, which focuses on how demographic differences between individuals and members of their work unit impact individual level outcomes (Joshi, Liao & Roh, 2011). In terms of age, relational demography research has focused on the individual-within-group level of analysis, such as studying how age differences between individuals and their peers affect work attitudes (Riordan & Shore, 1997). However, the influence of age differences between leaders and their subordinates has not been sufficiently addressed by this literature (Tsui, Egan & Xin, 1995).

This study investigates how leader-subordinate age differences affect subordinates' ratings of their leaders' effectiveness. In this regard, there are generally two classes of theories that explain how leader-subordinate age differences affect such performance ratings – directional theories, and non-directional theories. Both classes of theories are rooted in the notion that the perception of age differences between individuals can serve as a basis for sensemaking in social contexts. As such, age

differences can serve as a potentially dichotomizing factor in terms of social categorization, and likewise, in performance judgment.

Directional theories (e.g., Lawrence, 1984; implicit organizational age grading) suggest that leader-subordinate age differences create a dichotomy between status incongruent and status congruent subordinates. Subordinates who are status incongruent (i.e., older than their leader) provide lower ratings of leadership effectiveness than subordinates who are status congruent (i.e., younger than their leader) because they break with traditional organizational age grading norms. Non-directional theories (e.g., Byrne's 1971; similarity-attraction paradigm) suggest that age differences create a dichotomy between similarly and dissimilarly aged subordinates. Thus, subordinates who are dissimilarly aged (i.e., younger or older than their leader) should provide lower ratings of leadership effectiveness than subordinates who are similarly aged to their leader.

This study pits these two classes of theories against each other, in a strong inference framework (Platt, 1964). Furthermore, alternative hypotheses are tested that suggest that age difference between leaders and their subordinates may operate differently by workgroup, and approximate social competition (i.e., younger subordinates providing systematically lower ratings) or loyalty effects (i.e., older subordinates providing systematically higher ratings) (Vecchio, 1993).

To test these hypotheses, leadership effectiveness ratings were obtained from 449 workgroups across 89 different organizations. Each workgroup is composed of one leader, and subordinates with a heterogeneous age distribution (i.e., multiple subordinates who are younger, the same age, and older than their leader). Such

workgroups were purposefully sampled, because age differences should be a particularly salient, and potentially dichotomizing factor.

A meta-analytic strategy is employed to test for relational demography effects. The results of this analysis suggest some evidence for subtle effects of age on performance ratings that can be associated with the relational difference between subordinate and leader age. Furthermore, while the observed effects were small, evidence suggests that the direction and magnitude of the effects observed were heterogeneous. These findings suggest that attending to specific characteristics of individual workgroups is necessary to understand the manifestation of leader-subordinate age differences in the performance rating process.

AUTOBIOGRAPHICAL STATEMENT

Cort Whiting Rudolph entered the Honors College at DePaul University, in Chicago, Illinois in September of 2002, and in May of 2006 earned a Bachelor of Arts (Magna Cum Laude) in Industrial and Organizational Psychology with a minor in Writing, Rhetoric, and Discourse. His undergraduate thesis was entitled "The effects of national origin and applicant qualifications on personnel selection decisions." In September of 2006, Cort entered the doctoral program in Industrial and Organizational Psychology at Wayne State University, receiving a Master of Arts in Industrial and Organizational Psychology, with a cognate in Statistics, in May of 2009.   In 2009, he was the recipient of a prestigious Rumble Research Fellowship, and was awarded the 2011 Ross & Margaret Stagner Memorial Award for Excellence in Psychology.

Cort's program of research focuses almost exclusively on issues of diversity and inclusion in the workplace, including the impact of stereotyping on workplace processes, the influence of demographic diversity on workgroup processes, and more recently on how traditionally neglected factors such as national origin and bodyweight can affect evaluative workplace outcomes. Cort has presented his research at national and international conferences, in peer-reviewed journals, in book chapters, and through various media outlets, including Forbe's magazine. Cort enjoys teaching as well as scholarship, and has served as adjunct faculty for courses in Statistical Methods, Psychometrics, Industrial and Organizational Psychology, and Social Psychology at Wayne State University.   In August of 2011 Cort will be joining the academic faculty of Florida International University as a tenure-track assistant professor of Industrial and Organizational Psychology.