ABSTRACT

Title of dissertation: PROVIDING FEEDBACK TO GROUP CO-LEADERS TO IMPROVE GROUP CLIMATE: AN INTERVENTION TO FACILITATE SIMILAR MENTAL MODELS IN CO-LEADER TEAMS

Joseph R. Miles, Doctor of Philosophy, 2010

Dissertation directed by: Professor Dennis M. Kivlighan, Jr.
Department of Counseling and Personnel Services

This study examined the effectiveness of an intervention that provided feedback to co-leaders of intergroup dialogues about their mental models of their group members. Co-leaders completed similarity ratings of their group members, and group members completed a measure of group climate following each of seven weekly sessions. Co-leader similarity data was used to derive each co-leader's mental model of her or his group members for each session. Co-leaders in the experimental condition received feedback in the form of a graphical representation of their own and their co-leader's mental model of their group members after each session, and were provided with discussion questions to help them examine these mental models. Co-leaders in the control condition did not receive feedback, but were given discussion questions regarding the most important incidents in their most recent dialogue session. The Engagement and Avoidance aspects of group climate in the intergroup dialogues developed as predicted (i.e., Engagement significantly increased and Avoidance significantly decreased), however there was no significant change in the Conflict aspect of the group climate over time. Additionally, co-leader mental model similarity was not significantly related to any of the aspects of group climate as predicted. Finally, results indicated that the feedback

intervention did not significantly impact the level of similarity in co-leaders' mental

models, or the group climate.

Providing Feedback to Group Co-Leaders to Improve Group Climate:
An Intervention to Facilitate Similar Mental Models in Co-Leader Teams

By

Joseph R. Miles

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2010

Advisory Committee:

Professor Dennis M. Kivlighan, Jr., Chair
Professor Paul B. Gold
Professor Jeffrey W. Lucas
Professor Karen M. O'Brien
Professor William O. Strein

TABLE OF CONTENTS

LIST OF TABLES

Chapter 1: Introduction

Co-Leadership of Group Interventions

Co-leadership has long been a popular modality for the facilitation of group

interventions (Dreikurs, 1950; Roller & Nelson, 1993), and has been found to be at least

as effective as facilitation by a single individual (Hendrix, Fournier, & Briggs, 2001;

LoPiccolo, Heiman, Hogan, & Roberts, 1985; Mehlman, Baucom, & Anderson, 1983). In

fact, co-leadership may be the preferred method for leading group interventions (Rabin,

1967; Yalom & Leszcz, 2005). This may be because co-leadership provides many unique

benefits over leadership by an individual leader. For example, co-leaders may have

greater observational range and can allow for multiple points of view within the group

(Yalom & Leszcz, 2005). Co-leaders may also lessen one another's anxiety, provide a

means of debriefing post-session, and provide one another with support, gratification, and

validation (Heilfron, 1969).

Because this form of leadership involves two individuals working together, the

importance of the co-leader relationship has been highlighted in the literature on group

interventions (e.g., Dick et al., 1981; Dugo & Beck, 1991; Roller & Nelson, 1991). In

fact, in describing co-leadership of psychotherapy groups, Roller and Nelson (1991)

noted that "the relationship between the therapists is fundamental to the treatment

process" (p. 2). Dugo and Beck (1991) also highlighted the importance of the co-leader

relationship, and suggested that it is important for co-leaders to develop an identity as a

team (Dugo & Beck, 1991). Despite this recognition of the importance of the co-leader

relationship, relatively little research exists on co-leadership (Fall & Menendez, 2002;

Riva, Wachtel, & Lasky, 2004). Specifically, little is known about the development of the co-leader relationship, or the processes involved in co-leadership.

One important question on which little research exists is whether co-leaders of group interventions should be similar to or different from one another. This question is further complicated by the fact that the literature that does exist on co-leader similarity is equivocal c.f., Bernard, Drob, and Lifshutz, 1987; McGee & Schuman, 1970; Mintz, 1963; Piper, Doan, Edwards, and Jones, 1979; Roller and Miller, 1991; Yalom and Leszcz, 2005). This may be due in part to the many ways in which authors and researchers have conceptualized of "similarity."

Many authors have written about similarity with regard to gender (e.g., Lundin and Aronov, 1952; McGee & Schuman, 1970; Mintz, 1963; Roller & Nelson, 1991; Yalom and Leszcz; 2005). Most of these authors have suggested that a co-leader team that is dissimilar in terms of gender is ideal, as it most readily recreates the dynamics of the "traditional," heterosexual parental dyad, and thus easily serves as a catalyst for transference reactions to play out within the group (e.g., Lundin and Aronov, 1952; McGee & Schuman, 1970; Mintz, 1963; Roller & Nelson, 1991; Yalom and Leszcz; 2005).

Other authors have examined similarity in terms of co-leaders' theoretical orientations and the types of interventions they use (e.g., Bridbord, 2003; Bernard, Drob, & Lifshutz, 1987; Piper, Doan, Edwards, & Jones, 1979; Roller & Nelson, 1991; Yalom & Leszcz, 2005. Some of these authors have suggested that dissimilarity is preferred on these dimensions as this dissimilarity allows for multiple perspectives within the group (e.g., Piper, Doan, Edwards, & Jones, 1979; Yalom & Leszcz, 2005). Others, however,

have suggested that having similar theoretical orientations (e.g., Roller & Nelson, 1991) and using similar intervention strategies (Bridbord, 2003; Bernard, Drob, & Lifshutz, 1987) lead to compatibility and coordination within the group and are therefore some of the most important factors in the co-leader relationship.

Because co-leadership is an effective leadership modality (Hendrix, Fournier, & Briggs, 2001; LoPiccolo, Heiman, Hogan, & Roberts, 1985; Mehlman, Baucom, & Anderson, 1983), and because it is the preferred method of leadership (Kosch & Reiner, 1983; Rabin, 1967; Yalom & Leszcz, 2005), it is important to understand the processes involved in co-leadership. Because the co-leaders have been characterized as a "team," (e.g., Dugo & Beck, 1991), the literature on teams in industrial and organizational settings may provide a framework for understanding co-leadership.

Team Cognition and Co-leader Teams

Recent research has utilized the concept of *team cognition* from the industrial-organizational psychology literature to further examine similarity within co-leader teams (Miles & Kivlighan, 2008). Team cognition refers to the "overlapping of cognitions among team members" (Rentsch & Woehr, 2004, p. 12). These "overlapping" cognitions refer to team members' mental representations, or *mental models*, of the things like the team's task, the team's team process, and/or the team's and individual team member's attitudes and beliefs (Cannon-Bowers & Salas, 2001). Typically, research on team cognition has found that the degree of similarity in these mental models among team members is related to team performance, with more similarity in mental models within a team predicting better performance (e.g., Bonito, 2004; Espevik, Johnsen, Eid, & Thayer,

2006; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000; Waller, Gupta, & Giambatista, 2004).

Recent research on team cognition within co-leader teams found that similarity in co-leaders' mental models of their group members is related to the development of a productive group climate (i.e., one that is high in engagement, and low in avoiding; Miles & Kivlighan, 2008). This is significant because research also shows that group climate is related to positive group member outcomes (Kivlighan & Tarrant, 2001; Ogrodniczuk & Piper, 2003). Because many group interventions are of limited duration, and because co-leader mental model similarity appears to be beneficial for the group climate, manipulating (i.e., increasing) co-leader mental model similarity may be useful to obtain a more productive working relationship early in the life of the group. Some authors have suggested that team cognition may be augmented in this way (e.g., Cooke, 2005), thus increasing team performance, but no research has attempted to manipulate team cognition within co-leader teams of group interventions.

Research on team cognition has suggested that communication within a team moderates the relationship between mental model similarity and team performance (Mathieu et al., 2000; Bonito, 2004). Therefore an intervention aimed at increasing team cognition among group intervention co-leaders might attempt to increase the quantity and improve the quality of explicit communication between the co-leaders about the ways in which they are conceptualizing their group. One way to do this may be to provide the co-leaders with feedback as to each of their mental models of their group members and a structure for discussing this feedback.

Feedback Interventions

Feedback interventions aimed at individual therapists have been found to be useful (e.g., Hawkins, Lambert, Vermeersch, Slade, & Tuttle (2004; Lambert, Whipple, Smart, Vermeersch, Nielsen, & Hawkins, 2001). These interventions provided therapists with ongoing feedback as to their clients' intra-psychic functioning, interpersonal relationships, and social role performance throughout the duration of therapy. These feedback interventions proved to be related to client improvement, especially when therapy has been "off track." As such, a feedback intervention aimed at co-leaders of group interventions may be useful.

Research on feedback interventions directed at co-leaders is sparse, with only two published studies (Barlow, Hansen, Fuhriman, & Finley, 1982; Davies, Burlingame, Johnson, Gleave & Barlow, 2008). To complicate matters, these studies differed in their findings about the usefulness of co-leader feedback interventions, with Barlow et al. (1982) finding a feedback intervention useful in manipulating co-leader style, and Davies et al. (2008) finding no effect of an intervention providing group co-leaders and group members feedback as to perceptions of the group climate within the group.

The Current Study

The current study involved the implementation of a feedback intervention aimed at co-leaders of intergroup dialogues, a specific form of group intervention. Based on the findings of Miles and Kivlighan (2008) that found that co-leader mental model similarity is related to group climate, and the literatures on team cognition and feedback interventions, the current study used an experimental design to examine the effectiveness of a feedback intervention aimed at increasing the quantity and improving the quality of

explicit communication between intergroup dialogue co-leaders about their mental models of their group members. Specifically, co-leaders of intergroup dialogues made similarity ratings of each possible pair of group members, following each of seven intergroup dialogue sessions. These similarity ratings were used to derive each co-leader's mental model of her or his group members for each session. Co-leaders within the experimental condition received feedback based on their and their co-leader's mental models of their group members, following each of seven weekly intergroup dialogue sessions. This feedback took the form of graphical representations of their and their co-leaders' mental models of their group members for their most recent intergroup dialogue session. These co-leaders were asked to discuss this feedback with their co-leader and were given discussion questions to guide this discussion. Co-leaders in the control group did not receive feedback about their or their co-leader's mental models, but were also given discussion questions to guide a discussion among themselves about their most recent intergroup dialogue session. It was hypothesized that similarity in mental models would increase over time for all groups, but that this increase would be differentially higher in the experimental condition, as a result of the feedback intervention. It was also hypothesized that, due to this greater increase in similarity in mental models, group co-leaders in the experimental condition would be more effective in facilitating the development of a productive group climate within their groups, as rated by group members (i.e., one that is characterized by increasing Engagement, decreasing Avoidance, and an inverted U-shaped pattern of Conflict [low at the beginning of the group, high in the middle, and low at the end] across the life of the group).

Consistent with the hypotheses, Engagement increased over time, and Avoidance decreased, however there was no significant linear or quadratic change in Conflict over time. Contrary to the hypotheses, the results indicated no significant change in co-leader mental model similarity over time for either the treatment or control conditions. Also contrary to the hypotheses, similarity in co-leader mental models was not significantly related to any of the group climate variables for either the treatment or control condition, indicating that the feedback intervention was not successful in facilitating the development of team cognition in group intervention co-leader teams. However, the extent to which co-leaders believed their co-leaders were aware of their mental models and vice versa increased significantly over time, suggesting that co-leader teams may have *believed* that they were developing similar cognitions about group, even if this was not reflected in the similarity data.

Chapter 2: Literature Review

Definition of Terms

Co-leadership versus co-therapy. Throughout the literature on group interventions, the terms "co-leadership" and "co-therapy" are often used interchangeably. *Co-therapy* can be defined "as a special practice of psychotherapy in which two therapists treat a patient or patients in any mode of treatment at the same time and in the same place" (p. 2, Roller & Nelson, 1991). Because the purpose here is to discuss the co-leadership of group interventions more broadly (group psychotherapy being but one example of a group intervention), the term "co-leadership" will be used throughout this paper. This is an important distinction as Roller and Nelson (1991) suggest that research on co-leadership of this sort may have applications to other leadership teams and partnerships (e.g., co-parenting, business partners), not just co-therapy. Based on Roller and Nelson's definition, *co-leadership* is operationalized in this study as the practice by which two trained professionals lead a group intervention together at the same time in the same place.

Group intervention versus group psychotherapy. In addition, the term *group intervention* will be used throughout this study, unless referring to a previous study that addressed "therapy" specifically. The term *group intervention* has been chosen because it reflects an umbrella term for such varied interventions as group psychotherapy, psychoeducational groups, and intergroup dialogues. Each of these types of group interventions are often co-led, and as such, it is assumed that the current study may be generalizable to these varied settings.

Intergroup dialogue. Intergroup dialogue is a group intervention in higher education that brings together individuals from social identity groups with a history of tension between them (e.g., People of Color and White People, LGBT individuals and heterosexual individuals, women and men). Intergroup dialogue is based on Allport's (1954) intergroup contact hypothesis that suggested that intergroup contact has the potential to reduce prejudice when individuals are of equal status and are interdependently working toward common goals (Zuniga et al., 2007). As such, intergroup dialogue attempts to (1) foster sustained communication within and across social identity groups; (2) develop critical consciousness among participants about personal and social identities, and social systems; and (3) create opportunities to build bridges across social identity groups and to work toward social justice (e.g., Zuniga, Nagda, Chesler, & Cytron-Walker, 2007; Zuniga, Nagda, & Sevig, 2002).

Group Co-Leadership

Co-leadership of group interventions has been practiced since at least the 1920s when Alfred Adler used this technique in his clinics in Vienna (Dreikurs, 1950; Roller & Nelson, 1993). By the 1950s, therapists and researchers recognized the potential of co-leadership as a useful modality for facilitating group interventions, and advocated for its increased use (e.g., Hadden, 1947). However, little was empirically known about this new technique (Lundin & Aronov, 1952).

More than 60 years later, co-leadership of group interventions has become the preferred leadership modality (Rabin, 1967; Yalom & Leszcz, 2005) and a "vast amount" of literature on the topic of co-leadership exists (Fall & Menendez, 2002; p. 30). Luke and Hackney (2007) suggested that, "the anecdotal support of group coleader practice is

9

impressive if not convincing" (p. 280), but acknowledged that there is still a lack of empirical literature on co-leadership. Fall and Menendez (2002) also noted that even with the "vast amount" of literature on co-leadership, there is a lack of "empirical evidence on which to base recommendations about co-leadership" (p. 31). They went on to suggest, "The literature that supports the use of co-leaders in group work has one primary theme: it is based on anecdotal evidence of the author, supported by citations of sources that are often anecdotal reports of other authors" (p. 31). Similarly, as Roller and Nelson (1993) noted, "Psychotherapists...have been keenly interested in the relationships that their patients form with others, but [they] have been curiously reluctant to focus their attention on the relationships they themselves form with colleagues as they treat patients in the practice of cotherapy" (p. 304). This literature review on co-leadership summarizes both the empirical and anecdotal literature on co-leadership.

       Prevalence of co-leadership. Research has shown that co-leadership of is the preferred modality for leading group psychotherapy (Rabin, 1967; Yalom & Leszcz, 2005). For example, a survey of 38 members of the American Group Psychotherapy Association found a preference by the majority of those surveyed for co-leadership as opposed to individual leadership for group interventions (Rabin, 1967). Additionally, a study of third-year psychiatric residents also showed a preference for co-leadership over individual leadership as a modality for leading group interventions (Friedman, 1973). Unfortunately, the sample sizes in both the Rabin and Friedman studies were prohibitively small ($N = 38$ and $N = 11$, respectively), so statistical tests of significance could not be conducted, and generalizations may not be drawn. However, similar

preferences for co-leadership as the leadership modality have also been found for leaders of encounter groups (Dies, Mallet, & Johnson, 1979).

Contrary to the observations of the authors above, Roller and Nelson (1991) surveyed 94 group psychotherapists and found only 22% reported co-leadership of group psychotherapy was their preferred modality for clinical practice. The psychotherapists in Roller and Nelson's sample had varying degrees of experience with co-leadership, including a large number of therapists with no co-leadership experience, which may help explain the discrepancy in these findings.

Advantages of co-leadership. A preference for co-leadership may stem from the potential benefits it has for both the co-leaders and the group members (Roller & Nelson, 1993; Yalom & Leszcz, 2005). Yalom and Leszcz (2005) suggested that benefits to the co-leaders include the ability of the co-leaders to complement and support one another, greater observational range during the group, and multiple points of view about the group. Co-leadership also provides the opportunity for greater objectivity, provides opportunities for co-leaders to see any potential blind spots that a single leader may not notice, and provides opportunities for a leader to learn about her- or himself (Bailis & Adler, 1974; Lundin & Aronov, 1952; McGee & Schuman, 1970; Mintz, 1963; Roller & Nelson, 1993; Yalom & Leszcz, 2005). Additionally, co-leaders may depend on each other's presence to lessen their anxiety, to provide a means of debriefing post-session, and to provide one another with support, gratification, and validation (Heilfron, 1969).

Co-leadership also provides unique opportunities for novice leaders to learn from working with a more experienced leader (e.g., Alpher & Kobos, 1988; Yalom & Leszcz, 2005). For example, novice group leaders can co-lead sessions with more experienced

leaders, which may lessen the anxiety of a beginning leader and allow for valuable

feedback from the more experienced leader (Davis & Lohr, 1971; Lundin & Aronov,

1952; Yalom & Leszcz, 2005). Co-therapy in this sense is useful as a teaching and

supervision tool, since it is a model that is more experiential and less didactic than other

forms of supervision (Sidall & Bosma, 1976; Van Atta, 1969). Whereas other forms of

teaching and supervision only allow for interventions to occur after the fact, co-

leadership allows the supervisory interventions to occur during the actual group session

(Van Atta, 1969). Co-leadership involving the pairing of two student trainees may also be

beneficial (Reynolds & McWhirter, 1984). For example, this type of co-leadership also

allows for the opportunity for personal growth (e.g., learning to accommodate another

person), provides stability and objectivity, lessens trainee anxiety, spreads responsibility,

and increases accountability (Reynolds and McWhirter, 1984).

      The benefits of the use of co-leadership to the group members include the

catalyzation of transference reactions, opportunities for multiple leadership roles to be

played out within the group, and the modeling of healthy interpersonal interactions

between the two co-leaders (e.g., Bailis & Adler, 1974; Davis & Lohr, 1971; Dick,

Lessler, & Whiteside, 1981; Lundin & Aronov, 1952; McGee & Schulman, 1970; Yalom

& Leszcz, 2005). With regards to the catalyzation of transference reactions, Lundin and

Aronov (1952) noted from their experience co-leading groups for patients diagnosed with

schizophrenia that "the most outstanding [factor operating in co-leadership] is observed

to be the simulated family setting which is created by the presence of two authority

figures" (p. 77). They noted that this phenomenon was observed in the unconscious

feelings that become verbalized within the group (e.g., one patient asked them "what kind

of family is this?" and another stated that "it seems more like a classroom when [only] one person is here" [p. 77]). McGee and Schuman (1970) also pointed out that, although the presence of two leaders complicates the transferential phenomena, a majority of individuals may have had two transference figures in their lives (i.e., a mother and father), and may also have to share these figures with siblings (represented by other group members). As such, they suggested, co-led group therapy comes closer to replicating the dynamics of the family of origin than any other form of therapy. Interestingly, Lundin and Aronov noted that it was not necessary for the co-leaders to be of different genders to invoke these transferential reactions.

Yalom and Leszcz (2005) suggested that a major benefit of co-leadership is that it allows for multiple leadership roles to be played out within the group. For example, they suggested that (consciously or not) one co-leader may assume a more nurturing role, whereas the other may assume the role of provocateur. However, they warn that the co-leaders should not take on rigid roles within the groups.

A final benefit of co-leadership for the group members that is discussed in the literature is that it allows for modeling of healthy interactions and problem solving between two individuals (e.g., Bailis & Adler, 1974; Davis & Lohr, 1971; Lantz, 1978). In this way co-leaders serve as a model to group members by constructively resolving differences, and group members can learn through "imitation and identification" (Lantz, 1978, p. 157).

Co-leadership also provides practical benefits for the administration of the group. For example, the group may continue as scheduled even when one leader is ill or

otherwise unable to make a session or sessions (e.g., Bowers, & Guaron, 1981; Dick, Lessler, & Whiteside, 1981; McGee & Schuman, 1970; Yalom & Leszcz, 2005).

Research has confirmed that the above-mentioned benefits are incentives for group leaders to choose co-leadership over individual leadership. A survey of the American Group Psychotherapy Association in 1983 revealed that "the increased opportunity for learning that comes from discussion and collaboration with a peer" was the most common reason for choosing co-leadership of group interventions (Roller & Nelson, 1991; p. 12). Other reasons cited were "widened perspectives for therapists," "widened transference possibilities for patients," "greater learning opportunities for patients," and "opportunity for therapists to check and balance their complementary behavior" (Roller & Nelson, 1991; p. 15).

Disadvantages of co-leadership. Although the advantages of co-leadership have been widely discussed in the literature as cited above, several authors have pointed out several disadvantages associated with this leadership modality (e.g., Block, 1961; Maclennan, 1965). For example, Block (1961) suggested that competition could develop between co-leaders, thus hindering the work of the intervention. Roller and Nelson (1993) echoed this warning about the effects of competition within the co-leader relationship, suggesting that it is often considered the "most threatening dilemma" (p. 308) faced by co-leaders of group interventions.

Bowers and Gauron (1981) also suggested that because modeling is such a powerful force, it may be harmful to the group members if co-leaders model an *un*healthy relationship. They also suggested that for co-leadership to not be harmful to the group members, the co-leader relationship should not be the main focus of the co-leaders (to the

exclusion of what is best for the group). However, Dick, Lessler, and Whiteside (1981) pointed out that these problems may be more of a concern in the earlier phases of co-leader relationship development; once co-leaders work on developing their own relationship, they suggest, co-therapy becomes an effective and beneficial treatment modality.

Davis and Lohr (1971) suggested that while co-leadership may be useful for training purposes, the addition of a second leader does not add therapeutic value to the intervention. However this statement was made anecdotally based on their experiences with co-leadership, not on empirical research. Therefore an important question becomes whether there is therapeutic value in co-leadership of interventions over and above the value provided by individual leadership. Finally, Dick, Lessler, and Whiteside also pointed out that co-leadership may be an inefficient use of mental health resources (i.e., using two leaders instead of one for one group of individuals).

Co-leadership versus individually conducted interventions. As described above, many authors have written on the perceived benefits of co-leadership (e.g., Dick, Lessler, & Whiteside, 1980; Lundin & Aronov, 1952; Mintz, 1963; Roller & Nelson, 1991; Yalom & Leszcz, 2005), and it has been found to be the preferred method of leadership of group interventions (Rabin, 1967; Yalom and Leszcz, 2005). As such, several researchers have attempted to empirically examine the effectiveness of co-leadership, and to compare group co-leadership with interventions led by a single leader.

In one early attempt to empirically examine how co-leadership compares with individual leadership of group interventions, Rabin (1967) developed and administered a 50-item measure of attitudes toward these two leadership modalities to thirty-eight group

psychotherapists. Each item asked respondents to indicate whether co-leadership or individual leadership is more helpful in various aspects of group psychotherapy (e.g., "understanding transference"). Additionally, respondents were asked to rank criteria for why they might chose co-leadership over individual leadership of a group. Interestingly, responses for the majority of the items (32 out of 50) fell to one end of the scale or the other, indicating that respondents perceived a real difference between co-leadership and individual leadership of group interventions. For example, respondents indicated that co-leadership was preferred for reasons related to transference. Rabin also found that co-leadership was the preferred modality of treatment, and that respondents acknowledged a more "positive therapeutic movement, in general" in co-led groups as compared with individually led groups (p. 250). Finally, Rabin found that the top ranked reason for choosing co-leadership over an individual leader was "a good relationship between potential co-therapists" (p. 253).

Unfortunately, Rabin (1967) did not conduct tests of statistical significance due to his limited sample. Therefore, caution needs to be exercised in drawing conclusions and generalizing from this study. In addition, while this study was one of the first attempts to empirically examine co-leadership, it examined only attitudes toward co-leadership. It did not examine the development of the co-leader relationship, or how co-leadership affects group processes or outcomes.

Kosch and Reiner (1983) also examined therapists' attitudes toward therapy led by an individual therapist versus therapy led by a co-leader team. They randomly assigned unmarried female clients in a university counseling center to either a single therapist, or a co-therapy team. At both the initial and the final sessions, therapists rated

16

their attitudes toward both individual and co-therapy and answered questions regarding the therapy process. In addition, judges listened to tape-recorded sessions and rated "dimensions of facilitative core conditions" (p. 569), such as empathic understanding, respect, genuineness, and concreteness in expression in interpersonal process.

Kosch and Reiner (1983) found that the consensus among the therapists was that co-therapy was "better" (p. 577), and that it was the preferred modality for treatment. Interestingly, however, in terms of process, therapists rated client behavior similarly in both conditions. In addition, therapists did not rate their own behavior differently, did not feel they gained better understanding of their client, and did not feel more helpful in therapy conducted an individual therapist versus co-therapy.

Additionally, judges in the Kosch and Reiner (1983) study rated individual and co-therapists similarly on the core conditions of therapy for the first session, but individual therapists were rated to have increased their level of these conditions by termination, whereas therapists in the co-therapy condition remained the same. These data suggest that, while therapists may express a preference for co-therapy, there may be few differences in terms of process associated with these modalities, and the few differences that are perceived may tend to favor the use of individual therapy.

While this study provides interesting data about therapists' attitudes toward individual versus co-therapy, and their perceptions of its impact on therapeutic process, there are some limitations that should be noted. First, this study examined only therapy with an individual client. Therefore these data cannot be generalized to the leadership of group interventions. Also, data were collected in only the first and the last sessions of therapy. As such, the extent to which these results capture the process of therapy over

time is limited. Finally, these data address only process and not outcomes of the therapy. As such, it is not clear how the processes involved in therapy facilitated by an individual therapist and co-led therapy relate to client outcomes, and if outcomes are similar for each treatment modality.

Hendrix, Fournier, and Briggs (2001) also compared individually facilitated therapy with co-led therapy, but rather than examining the processes involved in the two treatment modalities, they examined differences in client outcomes. Specifically, they examined whether co-therapy is a "viable option for a training program" (p. 71), and whether "different pairings of cotherapists affect client outcomes" (p. 71). They assigned 402 cases seen in a marriage and family therapy training program clinic to either an individual therapist, a co-led therapy team with low experience, a co-led therapy team with high experience, or a co-led therapy team with a mixed experience level (one high-experience therapist and one low-experience therapist). Cases were assigned based on "a number of factors" (p. 69), including "the training needs of therapists," "experience level," and "overall difficulty of the case as determined at intake" (p. 69).

At the first session, Hendrix et al. (2001) had clients complete background forms, a couple or family version of a cohesion and adaptability scale, a relationship satisfaction instrument, and a communication instrument. Additionally, at the end of the third session or at drop out (whichever came first), therapists assessed the case with a Global Assessment of Functioning (GAF) score (from the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, 4th edition, as cited in Hendrix et al., 2001). The therapists' supervisors checked off on these GAF scores. At termination,

therapists also completed a termination form that included the number of sessions and the reason for termination.

Hendrix et al. (2001) found significant differences in the rate of completers (i.e., cases in which the initial therapy goals were accomplished by termination) or continuers (i.e., cases in which the clients attended three or more sessions but did not accomplish their initial therapy goals by termination), and dropouts (i.e., cases in which the clients dropped out before completing three sessions and have not accomplished their goals) based on the modality of treatment. However, they noted that "the majority of the differences" (p. 72) could be attributed to co-therapy pairs that included one faculty member therapist and one student therapist. These co-therapy pairs had 55% completers and only 5% dropouts. Rates of completers in the other treatment modalities ranged from 18-26%, and rates of dropouts ranged from 29-40%.

Hendrix et al. (2001) conducted another analysis looking just at individual student therapists versus student co-therapy pairs. This analysis did not reveal any significant differences in completers, continuers, or dropouts among cases seen by individual therapists versus co-therapy pairs (though there was a non-significant trend for individual therapists to have lower rates of completers and higher rates of dropouts. They also failed to find any significant differences in rates of completers or continuers among the co-leader teams based on experience level (though there was a trend for low-experience teams to have lower rates of completers, but higher rates of continuers). They concluded that, because there were no significant differences between individually conducted therapy and co-therapy, "client outcomes [assessed in terms of number of sessions

attended] for co-therapy were at least as good as individual therapists in terms of clients becoming dropouts, continuers, or completers" (p. 74).

A major limitation of the Hendrix et al. (2001) study is the non-random assignment of cases to either individual therapists or co-therapy teams. Cases were assigned based on "the training needs of therapists," "experience level," and "overall difficulty of the case as determined at intake" (p. 69). Therefore it is unclear weather the results can be attributed to the treatment modality (i.e., individual therapist versus co-therapy), the experience level of the co-therapy pairs, or some other factors. Additionally, "outcomes" were operationalized as the number of sessions attended. It may be that treatment modality has impacts on client outcomes other than rates of drop out and "completion." Finally, the Hendrix et al. study did not examine the processes involved in each treatment modality, and did not look at processes or outcomes over time.

Hendrix et al. (2001) also included a qualitative component in their data collection. They conducted three focus groups (one with experienced therapists, one with inexperienced therapists, and one with faculty supervisors) to examine the perceived rewards and challenges of co-leadership, costs and benefits of co-leadership to clients, and experiences with co-leadership and supervision. Rewards cited were increased willingness to take risks, the addition of another worldview, the ability to use meta-communication as an intervention in front of clients, and exposure to additional knowledge and resources. Challenges cited included issues of control, increased likelihood of learning something (presumably negative) about oneself in the co-leadership process, and the need for increased awareness of the therapy situation. Benefits for clients cited included the modeling of behaviors in sessions between the co-

leaders, and that each leader can bring her or his own strengths and knowledge to the therapy. Costs to clients cited included the dangers of having therapists who do not cooperate, leading to unfocused or ineffective therapy.

In the first controlled study to examine therapy conducted by an individual therapist versus co-led therapy, Mehlman, Baucom, and Anderson (1983) randomly assigned thirty distressed couples seeking behavioral marriage therapy to one of the following conditions: immediate therapy (i.e., within one week of the initial interview) with a male therapist, immediate therapy with a female therapist, immediate therapy with both the male and female therapists, delayed therapy (i.e., after 10 weeks on a waiting list) with a male therapist, delayed therapy with a female therapist, or delayed therapy with both the male and female therapists. Couples completed a measure of desired behavioral change (in their spouse) and a measure of marital satisfaction before counseling began and after termination. In addition, couple problem-solving interactions were coded for positive and negative behaviors. All couples received ten therapy sessions.

Mehlman et al. (1983) found that couples who received immediate behavioral marriage therapy (either with one or two therapists) had better outcomes than those couples that did not. However, no significant main effects or interactions were attributable to the number of therapists conducting the therapy. That is, there was no significant difference in outcome measures between couples that received therapy conducted by an individual therapist versus those who received co-therapy.

These results from the first controlled study of individually conducted therapy versus co-led therapy suggest that co-led therapy may be at least as effective (though no

better) than individually led therapy. The authors noted, however, that generalizations should be made carefully, as all couples in the co-led therapy condition were seen by the same co-therapy team. In addition, this study provides evidence for the effectiveness of co-led marriage therapy, but it is not clear whether these results would generalize to larger group interventions.

LoPiccolo, Heiman, Hogan, and Roberts (1985) also examined the effectiveness of co-therapy versus individual therapy in therapy for "sexually dysfunctional" (p. 287) couples. LoPiccolo et al. randomly assigned 65 couples to one of three treatment conditions: therapy by a single female therapist, therapy by a single male therapist, or co-therapy by a male-female co-therapy team. Couples then received 15 weekly cognitive-behavioral sex therapy sessions. At intake, prior to the first session, at post-treatment, and three months after termination couples completed and assessment battery including measures of sexual satisfaction and functioning, marital satisfaction, and sexual history.

LoPiccolo et al. (1985) found that patients improved on global marital and sexual satisfaction, and specific sexual dysfunctions (e.g., erectile failure, premature ejaculation, orgasm problems). However, there was no effect of treatment type (i.e., single therapist versus co-therapist) on any of the variables. LoPiccolo et al. concluded that sex therapy is effective, and that co-therapy is as effective as therapy by a single therapist.

The results of the Rabin (1967), and Kosch and Reiner (1983) studies suggested a preference among therapists for co-therapy, however they also suggested that there was little difference between co-therapy and therapy conducted by an individual therapist in terms of therapeutic processes. In addition, the Hendrix et al. (2001), Mehlman et al. (1983) and LoPiccolo et al. (1985) studies suggest that co-therapy is at least as effective

as therapy by an individual therapist. These studies suggest that co-leadership is an effective treatment modality, though they do not provide evidence of the superiority of co-leadership over therapy conducted by an individual therapist, and they do not speak to the use of co-leaders in group interventions. Additionally, none of these studies look at both processes and outcomes of co-led interventions over time.

The development of the co-leader relationship, The co-leader relationship has been compared to the relationship between husband and wife, as it represents a potential for both intimacy and conflict (e.g., Dick et al., 1980; Heilfron, 1969). It has also been cited as one of the most important factors in the process and outcome of co-led group interventions (e.g., Dugo & Beck, 1991; Hellwig & Memmott, 1974; Maclennan, 1965, McGee & Schuman, 1970; Rabin, 1967). Several authors have suggested that there are certain key ingredients in the co-leader relationship that help to make a co-leader team effective. One of the most often cited ingredients of a successful co-leadership relationship is open, honest communication (e.g., Bailis & Adler, 1974; Dick, Lessler, & Whiteside, 1980; Dies, Mallet, & Johnson, 1979; Hellwig & Memmott, 1974). For example, Bailis and Adler (1974), they stated that, in order for a strong working alliance between two leaders to develop, they need to successfully work through trust issues, competitiveness, and control issues.

This hypothesis that co-leader openness positively affects group process and outcome has even been examined empirically (Dies, Mallet, & Johnson, 1979). Dies et al. examined the openness and willingness to disclose of co-leaders in eight co-led encounter groups for training help center volunteers. The groups met for eight hours on two consecutive days. Prior to the first group meeting, and after the last group meeting, the

group members each completed a Willingness to Disclose Questionnaire (Dies, 1976, as cited in Dies et al., 1979). This is a measure containing 35 items pertaining to things that the co-leader may disclose during the upcoming encounter group weekend. Following the encounter groups, group members were asked to complete a measure of the quality of feedback provided within the group (this served as the measure of group process), to complete a measure of co-leader openness in personal, technical (e.g., about goals, process, etc.), and relational (i.e., between the two co-leaders) domains, to provide examples of co-leader openness, to rank order group members and co-leaders as to their levels of self-disclosure, and to complete measures of both the personal and technical aspects of the co-leaders' relationship. Following the second and last group meeting, group members also completed a group evaluation (this served as the measure of group outcome) and provided recommendations for future groups.

Dies et al. (1979) found that "in general, the most open leaders...conducted the 'best' groups, whereas the least open leaders conducted the 'worst' groups" (p. 535). More specifically, they found that all of the examples group members provided of openness in the relationship domain came from the most open eight group co-leaders, 6 of whom co-led "the three 'best' groups" (p. 535). (The authors noted that the "best" groups were those that scored highest on the quality of feedback, co-leader openness, and co-leader relationship measures.) Thus, it appears that openness between co-leaders about their relationship (as well as personal and technical openness) had positive impacts on group members' perceptions of group process. Interestingly, several co-leaders who led the "worst" groups were noted to be open about their relationship. However, the authors note that this openness was of a conflictual nature.

Dies et al. (1979) also found that co-leader openness affected group outcomes, with the "best groups" (i.e., those in which the quality of feedback was highest rated, co-leaders were considered to be more open, and co-leaders were judged to have a positive relationship) showing greater change in group members self-reported willingness to disclose from before the groups began to after the groups. This study was significant that it looked at both process and outcomes in these co-led groups, and it provides evidence that co-leader openness may affect group process and outcome.

In addition to good communication, constructive criticism between colleagues (Hellwig & Memmott, 1974); loyalty and gratification (e.g., Heilfron, 1969); trust (e.g., Weinstein, 1971), recognition and acceptance of differences (e.g., Hellwig & Memmott, 1974; Weinstein, 1971), and equal ability or peership (e.g., Hellwig & Memmott, 1974; Weinstein, 1971) have all been cited as ingredients for a successful co-leader relationship. Unfortunately, with the exception of openness (Dies, Mallet, & Johnson, 1979), these observations about the ingredients that help foster a strong co-leader relationship have come from anecdotal observations rather than empirical research.

Several authors have written on the evolution of the co-leader relationship (e.g., Dugo & Beck, 1991; Dick et al., 1980; McGee & Schuman, 1970). McGee and Schuman (1970) suggested that co-leader relationships develop through "a period of formation, a period of continued development, and a period of operation or stability" (p. 29). They highlighted the fact that the relationship "cannot be expected to be fully formed at its inception," and that "there will be differences and conflicts, as there must be in any meaningful relationship" (p. 29). According to McGee and Schuman, it is the ways in which these differences and conflicts are handled that determines the success of the co-

leader relationship. As such, they stated that openness and communication are key in developing a healthy co-leader relationship, and that conflict arising from within and without the group should be discussed.

Dick, Lessler, and Whiteside (1981) articulated one of the earliest stage models of the development of the co-leader relationship. They suggested that the relationship passes through four stages: *formation*, *development*, *stabilization*, and *refreshment*. In the first stage, *formation*, co-leaders focus on their intrapsychic issues (e.g., feelings of competency, anxiety, etc.) and basic interpersonal issues. According to Dick et al., during this stage, co-leadership does not benefit the group members. They also highlighted the idea that for co-leaders to move on to the second phase of development, they need to be open and honest with their thoughts and feelings. Once co-leaders have worked through these preliminary issues, they move on to stage two, *development*. During this phase, Dick et al. suggested that the primary focus becomes interpersonal. That is, "co-leaders can begin to support each other, making up for each other's perceived deficits or utilizing each other's special strengths" (p. 278). Stage three, *stabilization*, according to Dick et al., is characterized by a shift in energy flow from between the co-leaders to between the co-leaders and group members. During this phase, co-leaders begin to function "harmoniously" (p. 279), and it is "the most frequent operating stage for good [co-leaders] who work well together" (p. 279). The final stage, *refreshment*, is one of personal growth. Each co-leader is satisfied with both her or his own, and her or his partner's contributions, and brings fresh perspectives to the operation.

Dugo and Beck (1991) also formulated a stage model of the development of the co-leader relationship. They suggested that attention to the development of the co-leader

relationship is important because "groups often do not achieve a phase of development higher than the one that the co-therapists have achieved," (p. 156). As such, Dugo and Beck's comprehensive stage model of the development of the co-leader relationship specifically includes co-leaders working on developing their own relationship and their identity as a team before beginning to see their group. The nine stages in the Dugo-Beck model included: (1) creating a contract, (2) forming an identity as a team, (3) building a team, (4) developing closeness, (5) defining strengths and limitations, (6) exploring possibilities/reworking the original contract, (7) supporting self-confrontation, (8) deciding on whether or not to continue to work together, and (9) closing. Wheelan (1997) echoed the assertion that the development of a team mentality is a necessary prerequisite for successful co-leadership. This assertion rests on the assumption that when co-leaders come to agreement about the needs of the group and their goals for meeting these needs, they can "present a united front," and work "collaboratively as opposed to separately or competitively," which will, in turn, lead to more positive group dynamics and group member outcomes (Wheelan, 1997; p. 306).

In contrast to the other stage models of co-leader relationship development mentioned above, Fall and Wejnert (2005) believed that the development of the co-leader relationship parallels the development of the group itself. As such, they suggested that it may be beneficial to apply Tuckman's (1965, as cited in Fall & Wejnert, 2005) and Tuckman and Jensen's (1977, as cited in Fall & Wejnert, 2005) comprehensive model of group development. This model includes the stages of *forming*, *storming*, *norming*, *performing*, and *adjourning*. They noted that in the forming stage, co-leaders "are attempting to carve out a...niche and identity" (p. 315). Once co-leaders develop comfort

within the relationship and with one's own roles, they can then transition into the storming stage. This stage is characterized by increased conflict and hostility, as "facades and social personas give way to more honest views of others" (p. 317). At this stage, co-leaders struggle for control. Proper resolution of the storming stage allows for entry into the norming stage, which is characterized by increased cohesion. The acceptance and cohesion that develops within the norming phase allows co-leaders to "use their interpersonal structure as a tool to help maintain the momentum of the group and fine tune the co-leader relationship" (p. 321). Finally, all co-leader teams must go through the process of adjourning. This involves working through the issues associated with termination, and taking the time to say proper good-byes. Fall and Wejnert (2005) note that this stage model is useful in that it highlights the parallel processes between the co-leader pair and the group.

Though there are many models of the development of the co-leader relationship (e.g., Dick et al., 1981; Dugo & Beck, 1991; Fall & Wejnert, 2005), they all highlight the importance of this relationship, and the development of a team identity. While these models are useful for understanding the development of the co-leader relationship, there remains a lack of empirical literature on which to base our understanding of how the co-leader relationship develops.

The successful co-leader team. By definition, co-leadership of group interventions involves two leaders, which leads to an "intricate network of interactions" (p. 369, Heilfron, 1969). This includes the relationships between the co-leaders and one another, each co-leader and each individual group member, each co-leader and the group as a whole, the group members and one another, and the group members and the group as

a whole. Within this network of interactions, the relationship between the co-leaders and one another is fundamental to the processes and outcomes of the group (Roller & Nelson, 1991). In fact, Roller and Nelson (1991) suggested that co-leadership should not be considered a "technique" for the facilitation of interventions as "technique implies an operation that can be applied and then discarded" (p. 3). Instead, they suggested, that the commitment to the co-leader relationship is the "crucial factor in both the healing process and the change process" (p. 3). Therefore, it is important to understand the factors that affect the co-leader relationship and make a successful co-leader team.

Lundin and Aronov (1952) issued an early warning that the correct matching of co-leaders is crucial. Specifically, they noted that if group members sense a lack of respect or disharmony between co-leaders, they may be induced to strengthen, rather work through, their defenses that were established in childhood to protect them from similar, disharmonious parental relations. Similarly, Yalom and Leszcz (2005) also warned that one is better off leading a group alone than with a co-leader with whom she or he is incompatible. As such, they suggested, great care should go into the choice of one's co-leader, and one should not co-lead a group with someone they do not like or know well.

Openness and communication have been sited as some of the most important factors in a successful co-leader relationship (e.g., Dies, 1994; Heilfron, 1969; McGee & Schuman, 1970; Yalom & Leszcz, 2005). For example, Dies (1994) suggested that communication between the two co-leaders is "the foundation for effective coleadership" (p. 62). Heilfron (1969) also suggested that openness to "an honest exchange of ideas about individual group members and the movement of the group as a whole" is a

requirement for successful co-leadership (p. 368). Yalom and Leszcz (2005) suggested that discussion time is essential to the success of the co-leadership team. They suggested that at the least, co-leaders should meet with one another for a few minutes before each session to review the last session and discuss any possible agenda for the upcoming session, and for 15 to 20 minutes after each sessions to debrief and give each other feedback.

Roller and Nelson (1991) asked group psychotherapists what qualities they most desire in a co-leader of a therapy group. The most frequent response was "the capacity to be equal in communicating and openness," (p. 63). This included the ability to be comfortable asking questions of one's co-leader, critiquing one's co-leader, willingness to agree or disagree with one's co-leader, and openness to discuss theoretical and interpersonal differences. Other desirable characteristics for co-leaders cited were being of equal power and non-competitive, compatibility personalities, being well-trained, and similarity of theoretical orientation and personal values. Because it was clear that experienced co-leaders had strong opinions as to what they were looking for in a co-leader, Roller and Nelson (1991) advised that choosing one's own co-leader (versus being assigned) is preferable. However, the majority of research on co-leadership has been conducted in educational settings with co-leader teams that have been assigned for training purposes (Roller and Nelson, 1991).

(Dis)similarity of the co-leadership team. Co-leadership is more than just a treatment modality; it also involves a relationship between two co-leaders, which in turn affects the process and outcome of the intervention (Roller & Nelson, 1991). As such, an important question becomes what is the most appropriate composition of a co-leadership

30

team? McGee and Schuman (1970) suggested that there are many variables to consider about each co-leader when they are paired or choose to work together, such as each leaders' age, gender, marital status, prior experience in therapy, institutional affiliation (including status), personality characteristics, and interpersonal style (including assertiveness and passivity levels). Although McGee and Schuman suggested that these variables should be taken into consideration in co-leader pairings, they did not suggest whether similarity or dissimilarity in each of these domains is preferred.

Roller and Miller (1991) found that the opportunity for learning from one's co-leader is one of the most common reasons given for choosing co-leadership. Given that fact, they suggest that, "too much similarity [between co-leaders] poses no challenge, whereas too much difference feeds frustration and pointless conflict" (p. 12). The literature and research on the topic of co-leader similarity is equivocal, as "similarity" has been defined in many different ways.

Gender. If one of the factors that makes group co-leadership an effective leadership modality is the recreation of the family structure and the increased potential for transference reactions to develop, then it may "seem logical" that co-leader teams would be composed of mixed genders (Mintz, 1963; p. 34). In fact, some authors have suggested that the heterosexual, male-female co-leader dyad is "the most favorably balanced co-therapy dyad" (McGee & Schuman, 1970). This may be because mixed gender co-leader teams may provide more transference "targets for patients to project onto" (Roller & Nelson, 1991; p. 14). In their 1983 survey of the American Group Psychotherapy Association, Roller and Nelson (1991) found that the majority of therapists surveyed preferred a co-leader of the opposite gender. Reasons given for this

31

preference included balance, transference, modeling, and parenting (in descending order of frequency). Mintz (1963) suggested that, not only does a mixed gender co-leader team provide unique benefits over a same gender co-leader team, a mixed gender team is preferred and necessary for the group members to gain optimal benefits from the group. However, Mintz assumes that within a same gendered co-leader team, co-leaders must collude ahead of time to each "play" a role, with one therapist playing a stereotypically male role, and one therapist playing a stereotypically female role. She argues that "the real personality of the therapist" (as opposed to therapist "roles') is important in group therapy therefore a male and a female leader are both desired. Specifically, she states that if a group member "reacts, consciously or unconsciously, to one man as father and to another man as a mother, the unraveling of transference distortions becomes needlessly difficult" (p. 35). She goes on to state that a same-gender co-leader team is unacceptable, just as "a family of like-sexed parents is not acceptable" (p. 35). This argument rests on the essentialist assumption that there are qualities of male and female therapists (and parents) that therapists of the other gender cannot possess, and therefore they would have to play a role.

Yalom and Leszcz (2005) agreed that there are unique benefits to a male-female co-leader team, such as the evocation of the group as the family, fantasies about the co-leaders' relationship that may arise and can be explored, and modeling of healthy male-female interactions. However, they stated that they feel one is better off working with a co-leader of the same gender with whom she or he is compatible than with a co-leader of the opposite gender whom she or he does not know well. The assertion that a male-female co-leader team will evoke family dynamics rests on the heteronormative

assumption that all families consist of heterosexual female and male parents. Other authors have suggested that compatibility may be a more important factor than gender in creating a co-leadership team that will be successful. For example, Lundin and Aronov (1952) noted that if one of the benefits of co-leadership is the potential to simulate family dynamics allowing for increased transference opportunities, then one might conclude that a co-leader pair of opposite gender might be required (since "the average family includes two parents...[this mimics] a theoretically more literal reproduction of mother and father" [p. 77]). However they noted that in their experience of leading groups with patients diagnosed with schizophrenia, that male-male co-leader teams evoked the same transference phenomena. They suggested that this is because "the physical characteristics of the therapists become less important than the subtle psychological differences which schizophrenic patients can easily detect and respond to" (p. 77).

Theoretical orientation and therapeutic style. When asked to cite factors that led to the success of a co-leader team, psychotherapists in Roller and Nelson's (1991) sample rated compatibility in theoretical orientation as one of the most important factors. However, other authors have suggested that having multiple perspectives within a group, as might come from varied theoretical orientations is one of the advantages of the use of co-leadership (e.g., Yalom & Leszcz, 2005).

Bernard, Drob, and Lifshutz (1987) examined the relationship between co-therapists' perceptions of similarity with their co-leader and their perception of the co-therapy relationship. Specifically, they administered a therapist self-description questionnaire and a co-therapy relationship questionnaire to 42 co-therapists who had previously worked as members of a co-therapy team leading psychotherapy groups in a

variety of hospital settings (i.e., private, municipal, and veterans administration hospitals). In all cases, the co-therapy relationships being examined had been terminated, and the time between termination and the administration of the measures ranged "from a few months to about a year" (p, 99). In addition, Bernard et al. also administered a measure of the co-therapy relationship in question to the co-therapists' supervisors.

Bernard et al. (1987) found that two factors of therapeutic style correlated significantly with perceived compatibility between co-therapists: therapist self-disclosure and therapist directiveness. Specifically, they found that therapists who indicated little or no difference in how self-disclosing they are, and therapists who indicated little or no difference in directiveness, were more likely to view themselves as compatible. As such, Bernard et al. concluded that similarity in therapeutic style is a useful construct for predicting whether co-leaders of therapy groups will get along with one another. It should be noted, however, that this study used retrospective measures (i.e., in all cases the co-leader relationship had been terminated, in some cases for as long as a year), so these findings are based on co-leaders' recall of this relationship. In addition, this study did not examine the impact of co-leader similarity in therapeutic style on group processes or group member outcomes. A related study of compatibility in the co-leader relationship (Habib, 1996) found that compatibility between co-leaders of psychotherapy groups in college counseling centers was related to group member outcomes, with higher compatibility predicting better group member outcomes.

Piper, Doan, Edwards, and Jones (1979) examined co-leader similarity and consistency in the focus of their interventions, and its effect on the group process and outcomes in five outpatient therapy groups for patients diagnosed with "primarily

neurotic and mild characterological problems and definite interpersonal symptomatology" (p. 1082). Piper et al. listened to ten audio taped sessions from each of the five groups, and coded therapist and patient statements into a 16-cell matrix based on the content (i.e., "the focal unit of a...statement" which could be an "individual patient, a pair of patients, the group as a whole, or a nonperson discussion topic") and the type of work (i.e., "the investigation of a problem" which could be "conversational...[or] affective nonwork...or work focusing on a problem with or without evidence to support it) attributed to a statement (p. 1083). They determined similarity of co-leaders as the session-to-session difference of co-leaders' in scores in the different content subcategories. Treatment outcome was assessed through measures of both interpersonal functioning and general psychiatric symptomatology.

Piper et al. (1979) found that groups with *dissimilar* co-leaders had significantly higher levels of work focusing on a problem without evidence, and there was a trend toward groups with dissimilar co-leaders to also show higher levels of work focusing on a problem with evidence. They noted, however, that these differences between similar and dissimilar groups were minimal. Therefore, dissimilarity provided a slight advantage in terms of group process (as these groups showed higher levels of work focusing on problems both with and without evidence), but this advantage may have been negligible. They also only noted a significant difference between the groups with similar and dissimilar leaders on one of the six outcome measures. Patients from groups with *dissimilar* leaders scored better on a measure of interpersonal functioning. None of the other effects were significant. The authors concluded that dissimilar co-leaders may provide a benefit for their group in that they "provided a wider variety of interventions

for patients to work with...[and their] interventions may have complemented one another"

(p. 1088).

Bridbord (2003) also examined compatibility between co-leaders, and its affect on

co-leader relationship satisfaction. Specifically, she surveyed 54 co-leader teams (108

individuals) from college and university counseling centers, the American Group

Psychotherapy Association, a community-based mental health agency, and graduate-level

practica. Participants completed instruments assessing "co-leader characteristics,

personality structure, leadership characteristics, co-leader relationship compatibility, and

co-leader satisfaction" (p. 69). She found that perceived compatibility between behavior,

theoretical orientation, and differences between confrontation leadership styles were the

best predictors of co-leader relationship satisfaction.

Taken together, the literature on co-leader similarity in theoretical orientation and

therapeutic styles is equivocal. Some authors have suggested that similarity in these

domains is beneficial (Bernard et al., 1987; Piper et al., 1979), and Roller and Nelson

(1993) went even further in their discussion of the importance of similarity of co-leaders

in these domains, by suggesting that co-leaders may

> underestimate the effects that the divergence of their theoretical beliefs have on
> their groups...[and] the group may attempt to solve the dilemma by splitting the
> cotherapists along theoretical lines. What began as a divergence in theory between
> therapists may result in a deep division within the group (p. 309).

However other authors have suggested that dissimilarity in terms of theoretical

orientation and therapeutic styles provides advantages in that multiple perspectives may

be present within the group (Yalom & Leszcz, 2005).

Complementary functions. Rosenbaum (1983, as cited in Roller and Nelson,

1991) suggested that similar behavior and equality should take precedence over the use of

different but complementary functions among co-leader teams. Rosenbaum suggested

that co-leaders needed to work in a symmetrical fashion, and that inequality in the co-

leadership pair leads to limited success. However, other authors have cited

complementarity, two co-leaders' varying skill sets combine to make a cohesive whole,

as one of the most important factors in the success of a co-leadership team (e.g., Roller &

Nelson, 1991). Roller and Nelson (1991) noted that complementarity implies difference

between the co-leaders, but that this does not imply inequality of leadership roles. In their

1983 survey of the American Group Psychotherapy Association, Roller and Nelson

(1991) found that "complementarity of balance of therapists' skills" (p. 229) was the

number one factor ranked in response to the question of what are "the most important

factors in the success of the co-therapy team?" (p. 228). In this sense, *dissimilarity* of co-

leaders in terms of skills sets is cited as a factor in successful co-leadership of group

interventions.

  Experience level. Weinstein (1971) suggested that one of the guidelines for

choosing a co-leader should be the belief on the part of both leaders that they are equal in

competence as leaders. However, he noted one exception: in the case that co-leadership is

used as a modality for training. Several surveys have shown that co-leadership of therapy

groups in which a novice therapist is paired with a more experienced therapist is one of

the most common training techniques models for training new group leaders (e.g., Dies,

1974; Dies, 1980; Roller & Nelson, 1991).

  Roller and Nelson (1991) pointed out that the majority of the research that exists

on co-leadership of psychotherapy involves co-leadership pairs that are unequal in

experience, knowledge, and authority. As such, they suggested that in research, co-

therapy is not truly being examined at all. They suggested that, "rather the difficulty of two strangers relating to each other in an unfamiliar setting is being studied" (p. 40). Roller and Nelson coined a term for these co-leadership pairs, *nequipos* (the co-leaders are "neither equal in experience nor equally equipped with the knowledge and authority to do therapy" [p. 38]), to highlight their distinction from what they consider to be the *real* practice of co-therapy. Additionally, they stated that in the short term (i.e., less than six months), the use of this training model is "of uncertain value" (p. 39). Rather, they suggested that 6 months to three years is the minimum amount of time for a co-leader pairing of *nequipos* to be of significant training value.

In addition to actual differences in experience level, co-leaders' perceptions of their own abilities may also impact the co-leader relationship, and the group itself. In a grounded theory study of six doctoral students in a counselor education program, Okech and Kline (2006) found that concerns about one's competency was an important category of concerns that emerged. Specifically, co-leaders' perceptions about their own "ability to form honest and intimate relationships" (p. 171), and their perceptions about their own leadership competence were "an integral aspect of group co-leaders' relationships and functions" (p. 169). These competency concerns involved "anxiety about their effectiveness as group co-leaders, concerns about their co-leaders' evaluation of their competence, and apprehension about the effect these competency evaluations...might have on their co-leader relationships and their groups" (p. 169).

It may also be that what is called for in terms of co-leader dissimilarity or co-leader similarity varies not only along the dimensions of co-leader characteristics, but also by development phase of the group. For example, Yalom and Leszcz, (2005)

suggested that disagreement between co-leaders in sessions is generally unhelpful in beginning phases of the group, as the group may not be cohesive enough to handle it. However, they pointed out that group members often cite disagreement later on in the group as beneficial as they allow the group members to see the co-leaders as genuine and human, therefore strengthening "the honesty and potency of the group" (p. 446).

Cognitions about the group. A final aspect of co-leader similarity that has been discussed in the literature on group co-leadership is the cognitions that the co-leaders hold about their groups. For example, Roller and Nelson (1993) suggested that, "In general, cotherapists must agree on the diagnosis and the severity of the illness of each patient in order to formulate a coherent treatment plan and not sabotage each other's efforts" (p. 309). They went on to state that while "Cotherapists are sometimes able to combine a wide variety of opinion and yet coordinate themselves as a team...the groups they treat may not be so flexible, and the members may suffer constant anxiety about which therapist is right" (p. 309).

Miles and Kivlighan (2008) empirically examined whether similarity in co-leaders' cognitions about their group members related to the development of the group climate in intergroup dialogues. They found that similarity in cognitions about their group members increased over time related to more engagement and less avoidance in terms of the group climate, as perceived by the group members.

Group co-leadership and group climate. Group climate refers to the interpersonal environment of the group (MacKenzie, 1981; Mackenzie, 1983). Group climate includes factors such as engagement (which includes group cohesion), avoidance

(i.e., the extent to which group members avoid talking about their own or their group

members' problems), and interpersonal conflict.

The climate of a group is important in because research has shown that group

climate is related to group member outcomes (Ogrodniczuk & Piper, 2003), For example,

Ogrodniczuk and Piper (2003) examined the relation between group climate and group

member outcomes in short-term psychotherapy groups for psychiatric outpatients with

severe grief. Clients were administered the Group Climate Questionnaire-Short Form

(GCQ-S; Mackenzie, 1983) after every fourth session for 12 weeks. The GCQ-S contains

12 items that measure perceptions of group climate with regard to three scales:

Engagement, Avoidance, and Conflict. In addition, clients completed questionnaires and

interviews prior to the first meeting of the psychotherapy groups and following the

twelfth session to assess change, if any, in group member outcome variables (e.g., general

symptoms, grief symptoms, and life dissatisfaction). They found that the Engagement

aspect of group climate was significantly related to positive group member outcomes in

terms of general symptoms, grief symptoms, and life dissatisfaction, suggesting that there

is a relationship between an engaging group climate and group member outcome.

Additionally, research has found that group climate mediates the relationship

between leadership and group member outcomes (Kivlighan & Tarrant, 2001). In a study

of semi-structured, single-therapist-led groups for adolescents in state custody, Kivlighan

and Tarrant found therapist's intentions to be related to the climate of the group.

Intentions related to therapeutic work (i.e., exploration, insight, action) were negatively

related to an active and engaging group climate, as rated by the group members.

Intentions to work on the structure of the group were related to decreases in conflict

within the group. Additionally, they found that an active and engaging group climate was associated with positive group member outcomes. As such, Kivlighan and Tarrant suggested that group climate mediates the relationship between group leadership and group member outcomes in group interventions.

In a related study, McMahon and Links (1984) hypothesized that the development of the co-leader relationship in interpersonal psychotherapy groups affects the development of the group processes. Specifically, they suggested that the "pairing" of co-leaders (i.e., "seek[ing] gratification" from one another, "foster[ing] each other's self-esteem and present[ing] a united front to the group members" [pp. 385, 386]) serves to reassure group members and reduce the level of anxiety in the group). They also noted that, in their experience co-leading an interpersonal psychotherapy group, the pairing of the co-leaders in this way also stimulated pairing between group members, both within and without the group. This pairing of group members, they suggested, "foster[ed] group cohesion and group stability, thereby paralleling the cohesion and stability which was developing at the same time in the cotherapy relationship" (pp. 386-387). That is, the co-leaders' developing relationship served as a model for the group members, and therefore fostered the development of cohesion within the group. As such, McMahon and Links highlighted the importance of fostering the co-leader relationship *before* the start of the actual group. This is consistent with the articulation of the phases of co-leader relationship development articulated by Dugo and Beck (1991). McMahon and Links also noted that conflict between the group co-leaders may lead to division within the group, and may be reflected through increased conflict among the group members. Because the development of the co-leader relationship has the potential to affect the group climate in

41

this way, understanding the ways in which the co-leader relationship develops and functions across the life of the group.

Summary of the literature on co-leadership. The literature on co-leadership suggests that co-leadership is the preferred method of leadership of group interventions (e.g., Rabin, 1967; Yalom & Leszcz, 2005), and that it may provide unique benefits not found in interventions facilitated by an individual leader (e.g., Bailis & Adler, 1974; Davis & Lohr, 1971; Dick, Lessler, & Whiteside, 1981; Lundin & Aronov, 1952; McGee & Schulman, 1970; Yalom & Leszcz, 2005). The importance of the relationship between the co-leaders has been discussed (e.g., Dick et al., 1981; Dugo & Beck, 1991), and the need for co-leaders to develop an identity as a team has been highlighted (Dugo & Beck, 1991). Unfortunately, this literature contains primarily narrative accounts of the co-leader relationship and models of the development of this relationship based on the experiences of group co-leaders (e.g., Dick et al., 1981; Dugo & Beck, 1991). While these narrative accounts and models are useful to begin to understand the co-leader relationship and its development, there is much less empirical research on this complex relationship and how it relates to process and outcomes in groups. Additionally, the narrative and empirical literatures remains equivocal on important questions such as whether individual leaders in co-leader teams should be more similar or dissimilar to one another. For example, some authors suggest that dissimilarity is desired (e.g., in terms of gender, Yalom & Leszcz, 2005), while others highlight the importance of similarity (e.g., in terms of cognitions, Miles & Kivlighan, 2008).

The empirical literature that does exist has several limitations. Much of the research uses survey methodology asking co-leaders to reflect on their experiences and

attitudes about their experiences (e.g., Rabin, 1967; Roller & Nelson, 1991). Few studies have been conducted that have used experimental methods to examine group co-leadership, and the research that does exist has limitations as well, such as non-random assignment (e.g., Hendrix et al., 2001). Additionally, none of the existing research has used statistical methods (e.g., hierarchical linear modeling) that can take into account the nested nature of group data (i.e., sessions are nested within groups).

It is clear that more empirical research is needed to examine the co-leader relationship and, as such, there have been recent calls for continued empirical research on co-leadership, including research on components of the leadership team that lead to effective (or ineffective) co-leaders of group interventions (e.g., Fall & Menendez, 2002; Riva, Wachtel, & Lasky, 2004). Because co-leaders may be conceptualized as a team (e.g., Dugo & Beck, 1991), the literature on teams may provide a useful framework for understanding the co-leader relationship and provide opportunities for further empirical research on co-leadership.

Team Cognition

Recently, Tashiro and Mortensen (2006) highlighted the importance of using empirical research to examine the underlying causal mechanisms that make interventions (e.g., psychotherapy) effective. They suggested that *translational research*, which "revolve[s] around the broad idea of applying basic science findings to the prevention and treatment of illness" (p. 960), is a promising and underused technique for examining the mechanisms that underlie successful interventions. Social, cognitive, industrial-organizational, and other areas of psychology are rich in empirically grounded theoretical frameworks for understanding basic behavioral processes. the application of these

frameworks on basic behavioral processes may help researchers understand the applied areas of psychology, including counseling psychology and, more specifically, the co-leadership of group interventions. For example, the extensive research and theory surrounding team-level cognition that has been developed within industrial/organizational psychology may provide the framework and science on basic behavioral processes necessary for beginning to understand the co-leadership of group interventions.

Co-leader pairs are often characterized anecdotally as *teams* in the group intervention literature (e.g., Dugo & Beck, 1991). A team may be defined as "a distinguishable set of two or more people who interact dynamically, interdependently, and adaptively toward a common and valued goal/object/mission, who have each been assigned specific roles or functions to perform, and who have a limited lifespan of membership" (Salas, Dickinson, Converse, & Tannenbaum, 1992, p. 4). This definition clearly describes co-leader "teams" in the leadership of group interventions, who work together to facilitate the development of a safe and productive group climate and, ultimately towards positive group member outcomes. As such, the research and theory on teams from social and industrial-organizational psychology may provide a useful framework for examining the processes involved in the co-leadership of group interventions. One such area of research and theory that may be useful for understanding the co-leader relationship is that of *team cognition*.

Defining team cognition. Cooke et al. (2007) pointed out that for the past 50 years, "research and theory on cognitive structure and process occurring inside an individual's head have dominated...scientific psychology" (p. 239). However, they noted that several errors in *team-level* cognition have had catastrophic effects (e.g., the 1986

44

space shuttle *Challenger* launch, the response to Hurricane Katrina). They suggested that these events highlight the importance of understanding how cognition (e.g., formation of knowledge structures, memory, decision-making) operates on a *team* level.

Team cognition has been characterized both as "overlapping of cognitions among team members" (Rentsch & Woehr, 2004; p. 12), and as team-level processes and interactions (e.g., Cooke et al., 2007). Cooke et al. (2007) pointed out that the former characterization of team cognition emphasizes cognitive structures held by individual members of a team (i.e., *schemas*, or *shared mental models*), while the latter emphasizes cognitive activity on a team level (e.g., communication patterns within a team [Kiekel, 2005]).

Team cognition, broadly, was initially empirically examined in social and industrial/organizational psychology and business management, and this research has included concepts such as social loafing (i.e., the negative relationship between group size and group output; Karau & Williams, 2001, as cited in Cooke et al., 2007), small group decision-making, shared mental models, and team situation awareness (Cooke et al., 2007).

This portion of the literature review, and current study, focus on team cognition as it relates to the cognitive structures held by individual members of a co-leader team, and the extent to which these individual cognitive structures are similar across members of the team. However, as Klimoski and Mohammed (1994) pointed out, "although the measurement techniques used to index team mental models may be at the individual level, we are essentially dealing with a group-level phenomenon" (p. 426).

Klimoski and Mohammed (1994) suggested that, "'group mind-' like constructs have been in existence for as long as people have been interested in, and studied, groups as social entities" (p. 403). They went on to suggest that to understand this sort of "group mind" (i.e., *team cognition*), an understanding of individual cognitive processes is necessary, as "individual belief structures play a powerful role in the development of socially shared cognition" (p. 404). They pointed out that individuals make sense of their surroundings by organizing the information they take in into cognitive knowledge structures (Klimoski & Mohammed, 1994). These cognitive structures, or mental models, "are postulated to aid interpretive processes by enabling individuals to screen out information in order to prevent information overload and intolerable levels of uncertainty" (Klimoski & Mohammed, 1994; p. 405). As such, mental models play a central role in how individuals make sense of their environment.

Klimoski and Mohammed (1994) offered a working definition of *mental models*, suggesting that they are "a general class of cognitive constructs that have been invoked to explain how knowledge and information are represented in the mind" (p. 405). They suggested that "mental models reflect internalized beliefs, assumptions, and perceptions" (p. 426). The current study examined the ways in which co-leaders of group intervention represented knowledge and information about their group members in their minds. It was assumed that the mental models that co-leaders hold of their group members reflected their internalized beliefs, assumptions and/or perceptions of their group members. As such, the term *mental models* was used throughout the remainder of the literature review and study to refer to the cognitive structures that co-leaders held about their group

members (i.e., the ways in which knowledge and information about their group members was represented in their minds)

Overlapping mental models of team members are sometimes referred to as *shared mental models* (e.g., Hinsz, 1995; Hinsz, 2004; Stout, Cannon-Bowers, Salas, & Milanovich, 1999). However, Rentsch and her colleagues (Rentsch & Hall, 1994; Rentsch & Woehr, 2004) preferred to use "similar" over other terms (e.g., "shared") when referring to the overlapping cognitions of team members because it does not imply that team members' schemas will be identical as a term like "shared" might imply. Because the mental models of the co-leaders in the present study are not expected to be identical, the extent to which the mental models of the co-leader team members overlap will be referred to as *mental model similarity*. That is, *mental model similarity* in the current study refers to the extent to which co-leaders' mental models about their groups are similar, or the similarity with which co-leaders are organizing information about their group in their minds.

Rentsch and Hall (1994) stated that there are two forms of mental model similarity that can be examined in team cognition research: correspondence between content and correspondence between structure. Within team cognition literature, researchers may examine the team members mental model similarity regarding a wide range of content (Klimoski & Mohammed, 1994). For example, Klimoski and Mohammed reviewed the literature on mental model similarity and found that it contains research on mental models similarity with regard to the tools and technology employed by teams; the tasks of teams; knowledge, skills, or abilities of team members; behavior in teams; role expectations; or other environment stimuli. Similarly, Cannon-Bowers and

Salas (2001) suggested that the content of mental models within teams fall into four different categories: task-specific knowledge, task-related knowledge, knowledge of teammates, and attitudes and beliefs. Task-specific knowledge includes "specific procedures, sequences, actions, and strategies necessary to perform a task" (Cannon-Bowers & Salas, 2001; p. 197). Task-related knowledge includes knowledge about processes that are not necessarily task specific; for example, teamwork. Knowledge of teammates might include characteristics such as "preferences, strengths, weaknesses, and tendencies" (Cannon-Bowers & Salas, 2001; p. 197). The final category, attitudes and beliefs, is the broadest. It is based on the ideas that when team members hold similar attitudes and beliefs about the world, they are more likely to have compatible beliefs about their current task and environment.

Klimoski and Mohammed (1994) also pointed out that there are multiple descriptions of the form or structure that mental models take but all descriptions require that knowledge is organized some meaningful way. For example, many authors rely on the concepts of *scripts* or *schemas* from social and cognitive psychology to characterize mental models (Klimoski & Mohammed, 1994). As such, Klimoski and Mohammed made the argument that the form that a mental model takes "may be a function of the methods used by an investigator to measure it" (1994, p. 418). These methods will be described in further detail below.

For the current study, co-leader teams' mental models of the relationships between their group members were assessed using paired comparison ratings. Co-leader mental model similarity of their group members was assessed. These data were then analyzed using Pathfinder Network Analysis software (Schvaneveldt, 1990), which

provides a graphical representation of each co-leader's mental model of their group

members in which each group member is represented as a node plotted in space, and the

group members who the co-leader sees as more similar are connected by a line

(Pathfinder Network Analysis is described in greater detail below. Sample network

representation of "mental models" from two co-leaders of the same group, for the same

session is included in Appendix D).

Stout et al. (1999) suggested that "[Similar mental models] are thought to provide

team members with a common understanding of who is responsible for what task and

what the information requirements are. In turn, this allows them to anticipate one

another's needs so that they can work in sync" (p. 61). As such, the common hypothesis

in team cognition research is that "to the extent that mental models are shared (i.e.,

commonly held) by team members, improved team performance should result" (Rentsch

& Woehr, 2004, p. 12). In fact, Rentsch and Hall (1994) argued that similarity in mental

models within a team "is an essential factor in determining the quality of team process

and performance" (p. 224), because "individuals who have similar [mental models] are

likely to attend to, interpret, and communicate about the world more similarly than

individuals who have different [mental modes]" (p. 225).

It should be noted, however, that some authors have also pointed out that

similarity in mental models may have a "dark side" (Klimoski & Mohammed, 1994; p.

419). They said, "over reliance on shared information...may lead the group to under-

utilize the resources of the team" (p. 419). They suggested that, "the concept of 'group

think' has been coined to reflect the circumstances where there is too much [similarity] in

team members' thought processes or when they refuse to abandon consensually validated

but essentially incorrect views of the world" (p. 419). As such, they suggested that "completely overlapping mental models are...dysfunctional with regard to team performance" (p. 419). Fortunately, as Rentsch and Hall (1994) noted, identical mental models are "nearly impossible to achieve" (p. 233). This is because of individual differences in personal experiences on which mental models are created (Rentsch & Hall, 1994).

Cannon-Bowers and Salas (2001) pointed out that the concept of team cognition is useful for several reasons. First, they suggested that it has potential as an explanatory mechanism. That is, "it helps us to understand team performance by explaining how members of effective teams interact with one another" (p. 196). Second, team cognition has the potential to predict team effectiveness. They stated that, in this way, team cognition might serve as an indicator of a team's readiness to perform a certain task. Finally, they suggested that it may be a useful diagnostic tool to determine what a team's problems might be, and to provide insight as to how these problems might be addressed.

Measuring team cognition. In their review of mental models in team contexts, Klimoski and Mohammed (1994) noted that, "mental model measurement continues to be a challenging undertaking, given the fact that models often take multiple forms and are dynamic in nature" (p. 405). Similarly, Cannon-Bowers and Salas (2001) pointed out that the measurement of team cognition might occur in at least two broad ways: assessment of the content of team members' mental models, and assessment of the structure of team member mental models.

Mohammed, Klimoski, and Rentsch (2000) reviewed the literature on the measurement of team cognition focusing on methods that would assess both content and

structure. These methods included Pathfinder Network Analysis (Schvaneveldt, 1990),

multidimensional scaling, concept mapping, and card sorting. Pathfinder Network

Analysis takes raw similarity ratings (i.e., paired comparison ratings of important

concepts) and transforms them into network structures in which concepts are represented

as nodes, and related nodes are connected through links (Schvaneveldt, 1990;

Mohammed et al., 2000; see Appendix D for an example). These network structures

provide a graphical representation of individuals' knowledge structures (i.e., mental

models), showing how they mentally organized the information being examined. A

strength of this method of measuring mental models in this format is that Pathfinder

software (Schvaneveldt, 1990) provides a method for comparing the similarity of two or

more mental models. This similarity index is the ratio of links in common between the

mental models being compared over the total number of links contained in the mental

models being compared.

A second method for measuring mental models is multidimensional scaling

(MDS; Mohammed et al., 2000). As with Pathfinder Network Analysis, participants

provide ratings of similarity of predetermined (i.e., by the researcher) concepts, which are

then analyzed. MDS takes this proximity data and represents it in an n-dimensional

space.

Concept mapping is another method for measuring mental models (Mohammed et

al., 2000). However, contrary to Pathfinder and MDS analyses, the content of the mental

models being assessed is provided from the participants rather than the researchers. To

create concept maps, participants are asked to graphically represent and structure the

content of their own mental models.

The last method for measuring mental models discussed by Mohammed et al. (2000) is card sorting. Card sorting is a "time-honored assessment technique in psychology," in which researchers write concepts on cards and ask participants to sort them into piles based on which concepts are related. However, Mohammed et al. (2000) pointed out that a disadvantage to card sorting is that it provides only data as to how participants place information, whereas a method like Pathfinder Network Analysis, which uses similarity ratings, allows for the calculation of correlations and comparisons of mental models across individuals.

Because Pathfinder Network Analysis (Schvaneveldt, 1990) allows for the comparison of mental models between individuals through a similarity index, this method was used in the current study. Group co-leaders were asked to make similarity ratings of each possible pair of group members within their group, and these data were analyzed via Pathfinder software. The resulting network output included group members as nodes, and those group members rated as most similar were connected with links. This output served as the operationalization of "mental model" in this study, and allowed for the examination of the structure of co-leaders' mental models of their group members. It also allowed for the comparison of mental models within a co-leader team.

Research on team cognition. The research on team cognition has examined the relationship between mental model similarity among team members and team process and performance, and how similarity in mental models develops over time.

Similarity in mental models and team process and performance. Mathieu, Heffner, Goodwin, Salas, and Cannon-Bowers (2000) examined the relationships between team mental model similarity and team process and performance in a study of

52

undergraduate dyads teams working together to "fly" computer-based simulated flight missions. Participants received an overview of the flight simulation task and watched an automated demonstration. Next, participants were trained in the flight simulation task, with each member of the dyad receiving specialized training in a specific task relevant to the flight mission (i.e., one participant learned the joystick to control the plane, and one learned to call up weapon systems, control speed, and gather information). Both participants shared the task of firing weapons. This training taught "both individual task responsibilities and basic team processes (e.g., coordination of activities)" (p. 276). Following training, participants then completed a brief survey followed by two flight missions. This survey-flight mission sequence was completed three times.

Mathieu et al. (2000) examined teams' performance on the missions, team processes, team members' mental models, and mental model convergence (i.e., similarity). Team performance was assessed through points awarded in the mission (i.e., for surviving, following a preset route, and shooting down enemy planes). Independent observers rated team processes, specifically strategy and coordination, cooperation, and communication. Mental models of the task and of the concept of a team were examined by having each individual team member complete two matrices - one relating to the task, one relating to teamwork - in which they made similarity ratings of attributes of the task and attributes of teamwork, respectively. These ratings were analyzed using a network-analysis program, which allowed for the comparison of the mental models within teams. Specifically, the network analysis software provided a correlation between the matrices within a team, and this correlation was used as an index of convergence of team members' mental models of their task and team.

Mathieu et al. (2000) found that similarity in mental models among team members did not significantly increase over time. However, they found that correlations of the index of convergence for the same mental models (i.e., the task mental models of both dyad members or the teamwork mental models of both members) were significant across times. They concluded that teams that began with similar mental models retained similar mental models over time, and that there was little change in similarity of mental models over time.

Mathieu et al. (2000) failed to find significant correlations between similarity in task mental models and either team processes or team performance at all three points in time. However, they found significant correlations between similarity in team members' mental models about teamwork and team processes at the first and second data collection points and team performance at the second data collection point.

Mathieu et al. (2000) also conducted a repeated measures multiple regression to test a mediational model in which team processes (e.g., communication) mediate the relationship between team member mental model similarity and team performance. They found significant direct effects of both task and teamwork mental model convergence and team processes, and of team process on team performance. In addition, as hypothesized, they found that team processes fully mediated the relationship between team member mental model similarity and team performance.

While this study highlights the relationship between team member mental model similarity and team performance, specifically through team processes (e.g., communication), there are several limitations that should be noted in the Mathieu et al. (2000) study. First, the dyad "teams," and the flight simulation task were created

artificially for the purposes of the study. It is not clear whether the results would be similar with pre-existing teams in a more naturalistic setting. In addition, all participants were novices at this novel task, and the duration of the study (i.e., training and all three "missions" was two and a half to three hours). Teams had no expectation of ever working together on this (or presumably any other) task in the future. It may be that additional experience on the same team and with the same task would affect the degree of similarity in team member mental models over time (i.e., there may actually be measurable and significant change in the degree of similarity in team member mental models with continued exposure to the same teammates and task).

In another study examining the relationship between similarity in team member mental models and team performance, Waller, Gupta, and Giambatista (2004) collected data from 14 four- to six-person teams working in a nuclear power plant control room during monitoring, routine, and non-routine situations. They characterize these situations as "low-workload," "moderate-workload," and "high-workload," (p. 1535) respectively. Teams were videotaped in a control room simulation that included monitoring, routine, and non-routine scenarios. The simulation was also used by the organization that employed the crews as a performance evaluation, leading the authors to conclude that this was a "highly realistic and consequential environment" (p. 1538) for the crews.

Waller et al. (2004) hypothesized that hypothesized that during monitoring situations, higher performing crews would engage in the development of similar mental models to a greater extent than lower-performing teams. That is, during periods of lower-workloads, higher performing teams would establish plans and create shared understandings for dealing with future problems. They also hypothesized that higher-

performing crews would engage in more adaptive behaviors (i.e., information gathering, prioritizing, and task distribution) during non-routine situations and would spend more time developing similar mental models than lower performing teams. During routine situations, however, they hypothesized that higher-performing teams would spend less time developing similar mental models than lower-performing teams. They suggested that this is because "crews that spend time reiterating shared mental models of well-understood, routine problems might waste valuable resources (time and attention)" (p. 1537).

In addition to the above hypotheses, Waller et al. (2004) hypothesized that higher performing teams would engage in more face-to-face communication than lower performing teams, and that they would engage in less attention to time (i.e., be less preoccupied with time pressures) than lower performing teams.

Two independent raters coded the tapes for the occurrence of adaptive behaviors, development of similar mental models, face-to-face communication, and attention to time. Development of similar mental models "was coded as occurring when crew members acted to develop a shared understanding of a situation or response" (Waller et al., 2004, p. 1539), using behaviors prescribed by the organization (e.g., polling members, open discussion to develop an integrated understanding, summary and reiteration of discussion and plan). In addition, three licensed operators who served as trainers in the organization measured performance using industry standard forms.

Seven of the crews were identified as higher performing (i.e., they exhibited no performance deficiencies), and seven were identified as lower performing. Consistent with their hypotheses, Waller et al. (2004) did find that higher performing teams engaged

56

in more information gathering and engaged in significantly more development of shared mental models during non-routine situations than lower performing teams. However, they did not find support for their hypotheses regarding monitoring and routine situations; there was no significant difference in the time devoted to developing similar mental models between higher and lower performing teams during either lower- or moderate-workload scenarios. Finally, consistent with their hypotheses, Waller et al. found that higher performing teams engaged in significantly more face-to-face communication, and paid significantly less attention to time.

Waller et al. (2004) concluded that the ways in which crews adapt to non-routine, high-workload situations is a powerful differentiator of higher- and lower-performing crews. Specifically, they suggested that differences in the amount of time devoted to information gathering and the development of similar mental models during these situations are two of the most significant differences between higher- and lower-performing crews. The results of this study suggest that development of similar mental models may be particularly important during complex, abnormal situations, and that it may be related to higher performance.

A major limitation of the Waller et al. (2004) study is that the researchers examined only behaviors *assumed* to lead to the development of similar mental models. Waller et al. did not specifically examine whether these behaviors actually led to the development of similar mental models within the teams (i.e., they did not measure and compare the mental models of individual team members within teams). It may be that these behaviors are related to the development of other characteristics or team processes

(e.g., openness, leadership qualities) that affect performance, but not necessarily similar cognitions.

Espevik, Johnsen, Eid, and Thayer (2006) also examined team cognition in a complex work environment. Specifically, they looked at whether similar mental models of their team members would lead to better performance of four six-person teams of naval officers in submarine war game simulations. Espevik et al. (2006) examined the amount of knowledge individual team members held (i.e., concerning tasks, roles; as measured via a 17-item questionnaire), team performance (e.g., accuracy, mission effectiveness; as recorded by electronic simulator scoring), teamwork (i.e., information exchange, communication, supporting behaviors, and team initiative; as scored from videotapes of the simulations), and physiological arousal of individual team members (i.e., heart rate).

Each participant was a part of two, 50-minute war game simulations, one with her or his intact team (i.e., the team with which she or he was familiar), and one in which the second in command from the intact, known team was replaced with a second in command from a different team. For the purposes of this study, it was assumed that the intact teams would have similar mental models based on their work together and that teams with an unknown member would show a lower degree of similarity in their mental models because of this new member.

Espevik et al. (2006) found significantly better performance among intact teams as opposed to novel teams. Because intact teams were assumed to have more similar mental models, this finding supports the hypothesis that similarity in team member mental models is related to team performance. Additionally, they found higher levels of

communication and a trend toward higher levels of knowledge transfer in novel versus tact teams, suggesting that novel teams needed to spend more effort on sharing knowledge among team members as they built similar mental models. For intact teams, less communication and information sharing was necessary, as they had already developed similar mental models. Interestingly, Espevik et al. found a non-significant trend for higher heart rates among the team members when the team was novel, suggesting that having to develop similar mental models in a complex, high stress situation may be stressful for team members.

While this study might suggest that similar mental models and familiarity with one's teammates may lead to better performance and lower stress, as with the Waller et al. (2004) study, a major design flaw is that similarity in mental models was not measured. As such, the conclusions that can be drawn from this study are limited.

In another study of the relationship between team cognition and team performance, Edwards, Day, Arthur, and Bell (2006) examined the relationship between similarity in team member mental models and team performance in teams of male volunteers completing a video game task "designed to simulate a complex and dynamic aviation environment" (Gopher, 1993, p. 299, as cited in Edwards et al., 2006, p. 729). Participants were administered a measure of general mental ability and were categorized as either high (i.e., one standard error measurement above the mean) or low (i.e., one standard error measurement below the mean) ability. Participants were then randomly assigned to a two person team, such that 30 teams included two high ability team members, 31 included one high ability and one low ability team members, and 22 teams included two low ability team members.

The teams in the Edwards et al. (2006) study participated in 10 days of training for the videogame task, in which one team member was assigned functions involving use of the mouse ("managing mines and missiles" p. 730), and the other team member was assigned tasks related to use of the joystick ("piloting and firing the gun" p. 730). Following this first and third session (Times 1 and 2), participants individually completed similarity ratings of each possible pair of 14 concepts related to the videogame task. These ratings were then analyzed using Pathfinder software (Schvaneveldt, 1990) to examine participants' mental model accuracy and similarity of mental models within teams. Accuracy was defined as the degree of overlap between the participant's mental model and the mental model of an expert in the task. Both similarity and accuracy indices were the number of links in common between the two mental models being compared divided by the total number of links in both networks.

Edwards et al. (2006) hypothesized that both similarity and accuracy of mental models would increase over time. They also hypothesized that accuracy would be a better predictor of performance than similarity, as there was a defined optimal way to perform the task. Finally, they hypothesized that similarity and accuracy in mental models would mediate the relationship between team ability composition and team performance.

Edwards et al. (2006) found a non-significant increase in both similarity and accuracy across time (i.e., between Times 1 and 2). They hypothesized that the lack of a significant increase may be due to the short interval between Times 1 and 2. They also found that correlations between accuracy and performance were stronger than correlations between similarity and performance at both Time 1 and Time 2. Additionally, hierarchical regression analyses indicated that at Time 1, only ability (not

accuracy or similarity) predicted variance in team performance. However, at Time 2, accuracy predicted additional variance above and beyond ability and similarity. Finally, they did not find support for their hypothesis that mental model similarity would mediate the relationship between ability and team performance.

Though the Edwards et al. (2006) study has limitations in terms of the type of teams and tasks used (i.e., both were quite artificial), these findings suggest that accuracy in mental models, when there is a standard upon which accuracy may be judged may be an important factor in team performance, beyond mental model similarity They also suggest a trend toward the development of similar mental models among team members over time, though this process may take time.

Lim and Klein (2006) also addressed similarity and accuracy in mental models in relation to team performance, however they examined did so in the context of real-world work teams. They also hypothesized that both team member mental model similarity and mental model accuracy would be related to team performance. Additionally, they hypothesized that the relationship between mental model similarity and team performance would be moderated by mental model accuracy. To test these hypotheses, Lim and Klein examined 71 combat teams of seven or eight soldiers in the Singapore Armed Forces. Ten weeks after the teams were formed (Time 1), the researchers assessed both the taskwork and teamwork mental models of the soldiers, team leaders, and three subject matter experts. Mental models were assessed by having individuals make similarity ratings of 14 statements about procedures, equipment, and tasks; and of 14 statements describing team processes and team member characteristics, for taskwork and teamwork mental models, respectively. Three weeks later (Time 2), teams participated in

a one-day assessment of their combat performance readiness on six military tasks, assessed by 24 "combat center assessors" (p. 408).

Using Pathfinder software (Schvaneveldt, 1990), Lim and Klein (2006) examined the mental models of the participants and the subject matter experts, and calculated an index of similarity between team members' mental models and team members' mental model accuracy (i.e., similarity between team members' mental models and the subject matter experts' mental models). A similarity index was calculated as the total number of links in common between two team members' mental models, over the total number of links in the two mental models being compared. This index was calculated for each pair of team members, and the average similarity index for the team was computed and used in the analyses. The accuracy index was calculated as the total number of links in common between the team member's mental model and the subject matter experts' mental model, over the total number of links in the mental models being compared. Each team member's mental model was compared to that of the subject matter experts in this way, and the average accuracy score for the team was used in the analyses. Similarity and accuracy were calculated for taskwork mental models, and only similarity was calculated for teamwork mental models (the authors said this was because the concept of teamwork is subjective).

Using hierarchical regression analyses, Lim and Klein (2006) found that taskwork mental model similarity and accuracy were both significant predictors of team performance. However, there was no interaction, indicating that accuracy did not moderate the relationship between mental model similarity and team performance, as predicted. They also found that teamwork mental model similarity and accuracy were

both significant predictors of team performance. Again, accuracy was not found to mediate the relationship between mental model similarity and team performance for this type of mental model.

A major strength of this study is that it provides further support to the idea that teams that structure their knowledge more similarly (and who hold accurate knowledge) are more effective in actual field settings. While this study did address team processes (i.e., they examined team members mental models of teamwork), it did not observe or control how these processes played out within the group over time. This would be an important next step in understanding how team cognition may be augmented and increased, leading to these desired team performance outcomes.

Bonito (2004) also examined the relationship between similarity in mental models and team processes and performance. Specifically, he hypothesized that the quantity of information a group member holds (i.e., the actor effect), and the quantity of information her or his teammates hold (i.e., the partner effect), would be related to her or his substantive participation on the task at hand. In addition, he hypothesized that similarity of mental models (specifically mental models of a prototypical "ideal" team member) would moderate the relationship between quantity of information and substantive participation.

In order to test these hypotheses, Bonito (2004) had participants read 12 statements about the concrete behavior of a fictional character. They were then asked to make inferences as to the psychological profile of this character, Jim. The quantity of inferences generated by each participant was used as the measure of the quantity of information each participant held. Participants were also asked to consider and write

down the characteristics that they believe an "ideal" group member possesses. Participants then met in three-person groups and were assigned the task of discussing the psychological characteristics of Jim, and reaching a consensus about him and his characteristics. This group task was videotaped, and two coders coded the amount of substantive and nonsubstantive participation of each team member.

Bonito (2004) used an automated content analysis program to compute similarity scores of the ideal group member data within each group. This index and quantity of information were used as predictor variables for the analyses, and amount of substantive and nonsubstantive participation served as the criterion variables. These variables were analyzed in a multilevel model in which quantity of information served as the individual level predictor and similarity scores served as the group level predictor of participation.

Bonito (2004) found support for both the actor and partner effects, with quantity of one's own and one's teammates' information being related to substantive participation. In addition, he found support for the hypothesis that mental model similarity of an ideal member moderates the relationship between quantity of knowledge one holds and substantive participation. That is, an individual's participation increases as the amount of knowledge they hold increases, and this effect is most dramatic when mental model similarity is low.

These results suggest that mental model similarity affects team processes such as participation within a group. However, both the teams and the task in this study were artificially created for the purpose of this study. It would be important to replicate these findings in a more naturalistic team and task situation. Additionally, this study examined only team processes, not team performance. This may be because the task assigned in this

study (i.e., creating a psychological profile of Jim) did not lend itself to an evaluation of outcomes (i.e., there was no concrete "right" answer). Much could be gained from future studies that incorporate both team processes and team performance in the team cognition literature.

A final study on similar mental models and team process and performance examined these relationships in the context of experienced versus inexperienced teams. Cooke, Gorman, Duran, and Taylor (2007) assigned five three-member teams with experience in a "command-and-control" setting and ten inexperienced three-member teams to a "uninhabited aerial vehicle" (p. 146) simulation, in which they were asked to "fly" five missions involving taking pictures from a simulated aircraft. The simulation was designed to simulate a command-and-control environment in which team members have distinct, yet interdependent roles. Four of the missions involved identical workloads, and the fifth involved a higher workload (i.e., there were more targets to photograph in the fifth mission).

Cooke et al. (2007) measured performance in three training modules, team performance (i.e., team score on the mission, as scored by the software that ran it), team process scores (including communication and coordination, team decision making, and team situation awareness behavior, as rated by two of the experimenters on a five-point scale from "terrible" to "excellent"), team communication and coordination events (i.e., the amount and quantity of communication and coordination within the group), and team mental models of the taskwork. Mental models were assessed by having team members complete paired-comparison ratings of 11 task-related concepts on a six-point scale. These ratings were entered into Pathfinder (Schvaneveldt, 1990), and a similarity index

was calculated for each team. Taskwork mental models were assessed after the third and fourth missions, and the performance and process measures were taken during each 40-minute mission.

Cooke et al. (2007) found that experienced teams exhibited higher levels of performance than inexperienced teams on the first four missions. Experienced teams obtained higher team process scores, and exhibited a lower ratio of coordination events to communication events, suggesting that experienced teams spent less of their communication time on coordinating their activities, and may have been more efficient in their use of communication.

Most relevant to team cognition, Cooke et al. (2007) did not find significant differences in taskwork mental model similarity between experienced and inexperienced teams. Because similarity in mental models of the task did not significantly differ by experience level, but performance and team process did, Cooke et al. (2007) suggested that expertise was "manifest in team process" (p. 156). However, Cooke et al. did not examine team mental models of team processes, such as teamwork. Additionally, they did not examine the relationship between team mental model similarity and team performance. So while their results suggest there is a relationship between expertise and team processes and performance, the conclusions that can be drawn about the relationship between team cognition and team processes and performance are limited. These results show, however, that there is a relationship between team processes and team performance, which is similar to the findings of Bonito (2004) and Mathieu et al. (2000).

Finally, in a recent study applying the concept of team cognition to group co-leadership of group interventions, Miles and Kivlighan (2008) examined the relationship

between similarity in co-leaders' mental models of their group and the group climate in eight intergroup dialogues. Co-leaders of eight intergroup dialogue groups, consisting of five to thirteen undergraduate student members, completed paired comparison ratings of their group members following each of seven consecutive weekly sessions. Specifically, co-leaders were presented with a measure containing each possible pair of group members within their group, and were asked to rate the group members' similarity on a seven-point Likert scale. In order to provide a clean measure of the co-leaders' mental models, co-leaders were told that they could conceptualize similarity in anyway that they wished (i.e., they were not provided with a specific dimension on which to base their similarity ratings). Group members individually completed the Group Climate Questionnaire-Short Form (MacKenzie, 1983), a 12-item measure that examines group members' perceptions of the interpersonal environment of the group with respect to the levels of engagement, avoiding of problems, and interpersonal conflict.

Co-leaders' mental models of their groups for each session were individually examined by entering the co-leaders' similarity ratings into Pathfinder Network Analysis software (Schvaneveldt, 1990). Pathfinder was used to calculate a similarity index of co-leaders' mental models of their group members within co-leader pairs for each session. This index was calculated as the ratio of links in common between the two co-leaders' mental models by the total number of links in both mental model networks.

Using hierarchical linear modeling, Miles and Kivlighan (2008) examined whether similarity in mental models increased over time within co-leader teams, and whether similarity in mental models related to the development of the group climate, as perceived by the group members. Consistent with team cognition literature, Miles and

Kivlighan hypothesized that more similar mental models would be related to more effective co-leader team performance. Because research has found that group leadership is related to the group climate, which is in turn related to group outcomes (e.g., Kivlighan & Tarrant, 2001; Ogrodniczuk & Piper, 2003), co-leader team performance in this case was operationalized as the development of a productive group climate (i.e., one that is high in engagement, low in avoiding, and with a moderate level of conflict). That is, it was assumed that better co-leader team performance would be reflected in the development of a group climate that was high in engagement and low in avoidance.

Miles and Kivlighan (2008) found a non-significant tend for the increase in co-leader mental model similarity over time. Additionally, they found a significant negative relationship between co-leader mental model similarity after a given session and group member ratings of engagement during that session. That is, when group members perceived engagement to be low in a given session, similarity in co-leaders' mental models following the session was higher. Miles and Kivlighan hypothesized that when engagement was high in a given session, co-leaders may not have spent as much time communicating about their group following the session, because the intervention may appear to be on track. As such, their mental models may be less similar. However, if engagement in a session was low, co-leaders may have spent more time discussing the group after the session, and this time was reflected in increased similarity in their mental models after that session.

Interestingly, Miles and Kivlighan (2008) found that the level of co-leader mental model similarity following a given session was significantly, positively related to the level of the engagement perceived by group members in the following session. Miles and

Kivlighan concluded that when co-leaders had a higher degree of similarity in mental models following a session, they could then go into the next session with coordinated efforts and work toward similar goals. This is then reflected in increased engagement among the group members.

Additionally, Miles and Kivlighan (2008) found that the level of the co-leader mental model similarity after a given session was significantly, negatively related to group members' perceptions of the level of the avoidance in the group two sessions later. Miles and Kivlighan suggested that this may be a reflection of the stage of development of the group. That is, for group members to feel more comfortable with one another and to get to the actual work of the group (versus avoiding talking about actual problems), it may take more time than it does for the development of engagement with the group (which may feel less risky for group members). Regardless, it appears that similarity in co-leaders' mental models of their groups is related to decreases in avoidance, though these effects may take more time to appear in the group. Similarity in co-leaders' mental models was not related to the level of conflict in the group, which Miles and Kivlighan suggested may be expected due to the nature of the group (i.e., intergroup dialogues attempt to forge relationships and understanding across groups with a history of tension between them, so some level of conflict is expected and desired).

Miles and Kivlighan (2008) concluded that similarity in co-leaders' mental models of their groups is positively related to the co-leader teams' performance in that it is related to the development of a group climate that is higher in engagement and lower in avoidance over time. Miles and Kivlighan did not examine the processes through which similar co-leader mental models develop. However, they hypothesized that

communication between the co-leaders served a role in the development of similar mental models. As such, research specifically examining the effects of communication between co-leaders about their conceptualizations of their group may help explain these results.

Development of team cognition over time. Theory in the team cognition literature has suggested that similarity in mental models will increase over time, as similarity is a result of communication between team members within a team (e.g., Rentsch & Hall, 1994). However, research on this issue has been equivocal. As noted above, Mathieu et al. (2000) failed to find any significant changes in the degree of similarity in mental models across three time trials in their study of team cognition within undergraduate dyads working on a simulated flight mission task, and Edwards et al. (2006) found only a non-significant trend toward the development of similar mental models in their study of teams completing a complex, aviation video game task. These findings may be a result of the fact that the teams were artificially created for these studies and the tasks were also artificial and novel to the team members. In addition, the life of the teams in both studies was short; In both cases the teams existed merely for hours or days. It may be that teams in a more naturalistic setting and with longer team life may exhibit significant changes across time.

Levesque, Wilson, and Wholey (2001) addressed the question of whether similarity in team mental models increases over time in a study of 62 software development project teams. These teams were composed of 197 undergraduate students, and contained from four to seven members. These teams were tasked with developing a software product as a requirement for a course, and worked together for three and a half months. Participants completed measures assessing mental models of team process (i.e.,

communication, group climate, and team structure), mental models of expertise of team members, role differentiation, and team interaction (i.e., how much the participants worked with each other team member). All measures consisted of closed-ended questions on five- or six-point Likert scales. Similarity in mental models was operationalized as the within group correlations of the measures of mental models. Data were collected after month one, after month 2, and at the completion of the three and a half month period during which they worked together.

Levesque et al. (2001) conducted repeated measures ANOVAS to examine change over time in overall mental model similarity and found significant change over time. However, contrary to their hypothesis, similarity actually *decreased* over time. This pattern held true for mental models of both team processes and expertise.

Levesque et al. (2001) concluded that a potential reason for why these software development teams' mental models became less similar over time had to do with increased specialization within teams, and decreased communication. A structural equation model confirmed that role differentiation at Time 1 related to the degree of similarity in mental models at Time 3, through the level of interaction at Time 2. These results support the contention that communication between team members is essential for the development of similar mental models (e.g., Rentsch & Hall, 1994; Mathieu et al., 2000). However the question remains of whether mental model similarity will increase over time among team members on teams with continued communication.

Kivlighan, Markin, Stahl, and Salahuddin (2007) also examined the development of mental models over time. Specifically, they examined whether the mental models of nine novice group psychotherapy trainees became more similar to those of their

71

experienced group psychotherapy instructor. In this study, participants (the trainees and the experienced leader) completed similarity ratings of each possible pair of group members in their therapy group on a nine-point Likert scale at two points in time, after session four and after session sixteen. They then analyzed these matrices using both multi-dimensional scaling (MDS) and Pathfinder Network Analysis to examine how the trainees and experienced leader were organizing knowledge about the group. They found that the experienced co-leader had a significantly more complex mental model of the group after session four than the trainees. At session sixteen, trainees had become more similar to the experienced leader in terms of complexity.

While the Kivlighan et al. (2007) study did not address the development of team cognition specifically (i.e., it did not examine the similarity of the mental models of all of the team members across time), it does suggest that mental models may become more similar over time among a group of individuals. Specifically, it suggests that expertise may be a contributing factor in changes in mental model similarity. That is, mental models may become more similar by coming to resemble those of the most expert team member. However, this study did not examine the effects of this similarity on group process or outcome. As such, it is unclear that the development of mental models similar to the experienced leader led to improved group processes or outcomes.

As mentioned above, Miles and Kivlighan (2008) also addressed change in mental model similarity over time in a study of co-leadership of group interventions. Over seven weekly sessions, they found that there was a non-significant trend for mental models to become more similar within co-leadership teams. Miles and Kivlighan hypothesized that one reason team cognition tended to increase in this study, where it failed to increase in

others is the nature of the tasks of the teams. Specifically, in the studies by Levesque et al. (2001) and Mathieu et al. (2000), the tasks assigned to the teams were artificial, and also required much specialization among team members. Thus, to perform more effectively, team members would have to have specialized knowledge of their own role and task, not shred by other team members. However in the studies by Miles and Kivlighan (2008) and Kivlighan et al. (2007), the tasks were the co-leadership of group interventions. Rather than specialization and compartmentalization of tasks by team members, co-leadership of this type requires the co-leaders to work together and simultaneously on the same task (e.g., the creation of a productive group climate; group member change).

Augmented team cognition. The research on team cognition has shown a clear relationship between similarity in mental models and other team-level cognitive activities, and team effectiveness (e.g., Bonito, 2004; Espevik et al., 2006; Mathieu et al., 2000; Miles & Kivlighan, in press; Waller et al., 2004). As such, Cooke (2005) pointed out, "the need for facilitating team cognition has been recognized" (p. 1212), even in "relatively mundane team-level cognitive activities" (p. 1212). She suggested that "just as individual productivity can improve with cognitive aids and focused training, so can team effectiveness" (p. 1212). Researchers have recently begun to focus on diagnosing the need for cognitive aids and training, and designing interventions to facilitate team cognition (e.g., Diedrich, Freeman, Entin, Weil, & MacMillan, 2005; Henning, Smith, & Korbelak, 2005; & Kiekel, 2005). Cooke (2005) refers to this "application of technology to train team training programs or work environments for the purpose of improving cognitive effectiveness at the team level" (p. 1211) as *augmented team cognition*.

Researchers have manipulated congruence between organizational structure and a team's mission (Diedrich et al., 2005), used social-psychophysiological (e.g., heart rate, breathing, etc.) feedback within teams (Henning, Smith, & Korbelak, 2005), and analyzed patterns of communication within and between teams (Kiekel, 2005) in efforts to facilitate team cognition and, thus, improve team performance.

While the use of interventions such as these to augment and facilitate team cognition has been promising, this remains a relatively undeveloped area of research. For example, no interventions have been developed specifically addressing co-leader teams in group intervention leadership. Because there is evidence that team cognition within co-leader teams is related to the development of a productive group climate (Miles & Kivlighan, 2008), the development of an intervention that augments and facilitates the development of team cognition of co-leader teams may be useful. The provision of feedback to the group co-leaders may be one important component of this type of intervention.

Rentsch and Hall (1994) pointed out that as team members work together, they are "important sources of information" (p. 237) for each other. Specifically, team members develop "implicit theories about their teammates" (p. 237). These "theories" may include thoughts about how their team members are thinking about their task or team (i.e., mental models about their team members' mental models of their tasks and team). Rentsch and Hall also suggested that "high agreement" (i.e., high similarity; p. 237) in team members' mental models, and "high accuracy" (p. 237) in understanding one's teammate's mental models are conditions likely to lead to team effectiveness. In other words, having similar mental models within a team, and knowing it, may lead to team

74

effectiveness through agreement on the task at hand, team efficiency, coordination of efforts, improved communication among team members, enhanced cooperation, and a reduction in negative team processes such as competition and wasted effort (Rentsch & Hall, 1994).

As such, a feedback intervention that allows team members to explicitly discuss their mental models may be useful in making each others' mental models explicit to one another and lead to the development of similar mental models within the team. In group co-leader teams, this may include having co-leaders explicitly discuss with one another how they are viewing their group and their group members (i.e., their mental models of their group members). This may increase agreement among co-leaders as to their conceptualizations of their group, as well as increase accuracy with which co-leaders' think their co-leader is conceptualizing the group. This increased agreement (i.e., similarity) in terms of the co-leader teams' mental models, and accuracy with which co-leader team members think about their team members' mental models may, in turn, increase their ability to coordinate their efforts and work toward common goals within each session (e.g., Rentsch and Hall, 1994).

One form that this sort of intervention might take is the provision of feedback to co-leader teams about the structure of each individual co-leader's mental model of their group members, thus allowing them to explicitly discuss the ways in which they are seeing the group similarly or differently. This is consistent with the model put forth by Mathieu et al. (2000) in which team processes (e.g., communication) mediated the relationship between mental model similarity and team performance.

Summary the literature on team cognition. Team cognition refers to the "overlapping of cognitions among team members" (Rentsch & Woehr, 2004, p. 12). The content of these cognitions (i.e., mental models) can be taskwork or teamwork related (c.f., Cannon-Bowers & Salas, 2001). That is, they may refer to elements of a team's task (e.g., equipment), or they may refer to team processes (e.g., communication). Research on team cognition generally suggests that similarity in mental models is related to team performance (e.g., Bonito, 2004; Espevik et al., 2006; Mathieu et al., 2000; Miles & Kivlighan, in press; Waller et al., 2004), with greater similarity relating to better performance. Additionally, research suggests that this relationship is moderated by team processes, and including communication (e.g., Bonito, 2004; Mathieu, et al., 2000; Waller et al., 2004).

Recently, researchers have begun to manipulate team cognition in order to increase team mental model similarity by augmenting team cognition with technology or data sources (c.f., Cooke, 2005). This suggests that it may be possible to create team-level interventions focused on increasing team member mental model similarity in an effort to improve team performance. These interventions may specifically focus on team processes, such as communication within the team, in order to increase mental model similarity. One possible way to structure these interventions may be to provide teams with feedback regarding all team members' mental models and have them discuss this feedback with one another, in order to facilitate communication as to how team members are conceptualizing their task and/or team. The current study does this by providing co-leader teams feedback in the form of graphical representations of the mental models of both co-facilitators, and asked co-leaders to discuss this feedback with one another in an

effort to increase the similarity in their mental models over time, and ultimately improve their performance as a co-leader team as reflected in the development of a productive group climate.

Feedback Interventions in Group and Individual Psychotherapy

In a review of the literature on feedback in group psychotherapy, Kivlighan (1985) pointed out that feedback is often considered one of the essential features of group interventions, but little research has been conducted on this feature, especially when the feedback is directed at the group leaders themselves. Additionally, Dies and Dies (1993) suggested that group co-leaders and researchers have learned to work together and trust one another, and that research can provide group leaders with valuable feedback for improving their interventions and group member outcomes.

Feedback interventions aimed at group co-leaders may improve group dynamics and client outcomes, and thus Dies and Dies (1993) proposed an intervention that incorporates research on group interventions, and which includes the use of feedback to group leaders. Specifically, they divided group interventions into four phases: negotiation (pretreatment), retention (early treatment), enhancement (commitment to treatment), and evaluation (post-treatment and termination) and discussed how research measures could provide feedback to group leaders at each phase that would help them in facilitating the group. For example, they suggested that measures of goals, symptoms, personality traits, self-concept, and social functioning might be useful in the negotiation phase. In the early phases, they suggested that measures of willingness to disclose, interpersonal behaviors, group climate, and client concerns about sessions might provide useful feedback to group leaders. In the enhancement phase, Dies and Dies recommended measures of critical

incidents, self-disclosure scales, and group climate measures. Finally, in the evaluation phase, they suggested that re-administering the pre-group measures and administering client satisfaction measures might be useful for providing feedback to the leaders.

While these recommendations sound promising, Dies and Dies (1993) did not empirically examine them. Davies, Burlingame, Johnson, Gleave and Barlow (2008) noted that, in fact, there is almost no literature pertaining to feedback directed at leaders of group interventions. They noted only one example, a study by Barlow, Hansen, Fuhriman, and Finley (1982), in addition to their own study on the topic.

Barlow et al. (1982) examined the relationship between co-leader verbal style (rated using the Hill Interaction Matrix [Hill, 1965, as cited in Barlow et al., 1982]) and group member satisfaction and self-concept in eight six-person groups of "students enrolled in a small group interaction" (p. 521). Groups were co-led by six teaching assistants paired with six doctoral practicum students. Barlow et al. (1982) manipulated leadership communication style in the experimental groups by training them in the Hill Matrix, and assigning leaders in these groups to use either a speculative style (i.e., "'in the here-and-now,' speaking for oneself, and speculating about the meaning of one's own or another person's behavior" [p. 520]) or a confrontive style (i.e., "the speaker focuses on the present interaction...[and] reveals the impacts of his/her own or another person's behavior is having on him/her" [p. 520]). Following training, these co-leaders conducted a "simulated group" (p. 522) and received feedback on their use of their assigned leadership style. No other feedback was given during the course of the study. In the control groups, co-leader style was not manipulated, and co-leaders received training "to

equalize exposure to potential small group situations" (p. 522). These co-leaders received no feedback.

Groups then met for 30 hours (five sessions) within a ten-day span, and group members completed a self-concept measure during the first session and at the completion of the final session. At the completion of the final session, group members also completed a measure of their satisfaction with the leaders, and a measure of their perception of the co-leaders' leadership orientation (i.e., "charisma, love-orientation, peer-orientation, and technical orientation" [Barlow et al., 1982; p. 521]). Sessions were audio taped and a rater examined transcripts of randomly sampled segments of tapes to assure that co-leaders in the experimental group conformed to their assigned leadership style, and to examine the communication styles of the group members. In addition a chi-square test revealed a significant difference in the verbal communication styles across the two conditions, suggesting that the manipulation of the variable leadership style was successful.

A chi-square test also indicated that group members in the different conditions exhibited different communication styles. Specifically, group members in the groups led by confrontive co-leaders spoke in a more confrontive and pre-work styles. Barlow et al. (1982) suggested that this increase in confrontive style shows the effects of modeling within the group. They also hypothesized that the increased pre-work style reflected group members' attempts to retreat to safety because the confrontive style is difficult to maintain over long periods of time. Group members in the groups led by speculative co-leaders also exhibited increased communication in a speculative style, again suggesting that modeling has taken place.

Barlow et al. (1982) found no significant relationship between co-leader style and either group member satisfaction with their co-leaders or group members' self concepts. However, a chi-square test revealed that group members in the different conditions perceived their leaders differently. Specifically, group members with confrontive co-leaders viewed their co-leaders as more charismatic and less peer-oriented. Group members in groups with speculative co-leaders viewed their co-leaders as less charismatic, but more peer-oriented.

These results suggest that feedback to co-leaders prior to the start of a group about their co-leadership style may have significant effects in the way that co-leaders run their groups. However, this study did not examine the effects of feedback to group co-leaders once the group has begun, or across the life of the group. The feedback that was given was in the context of training, and did not involve the actual groups that the co-leaders led. Feedback given about actual group sessions, and during the actual group may be useful for the diagnosis of problems during the group and the coordination of efforts while the group is in progress.

Davies et al. (2008) examined the effects of on-going, weekly feedback to group members, group leaders, and the group as a whole, based on Dies and Dies (1993) model for providing feedback. Group members in sixteen co-led psychotherapy groups, (four to twelve members per group) completed a group climate measure (the Group Climate Questionnaire-Short Form [GCQ-S]; MacKenzie, 1981); a measure of the presences and helpfulness of therapeutic factors in the group; and an outcome measure assessing intra-psychic functioning, interpersonal relationships, and social role performance following each of 13 weekly sessions. Groups were assigned to either a feedback (experimental) or

no feedback (control) condition. In the feedback condition, group leaders were provided with training on how to use the results from the GCS-S in their groups. These co-leaders were given a graphical representation of their group's GCQ-S responses several days before their next session, and during the session, co-leaders distributed graphical representations of the same data to their group members for discussion. For example, co-leaders might process with the group that many members felt a high level of conflict in a previous group.

Interestingly, and contrary to their hypotheses, Davies et al. (2008) found that their feedback intervention had no significant positive effects on either the development of the group climate or the group member outcomes. Slopes for both the levels of engagement and cohesion within the group were not significantly different in the experimental and control conditions, and these slopes were not significantly different from zero. Additionally, an ANOVA showed that there were no significant differences in the outcome measures between the two conditions.

Davies et al. (2008) suggested that these results might mean that their feedback intervention itself was ineffective. Additionally, they suggested that it may be that the sort of feedback provided was only relevant to group co-leaders, not to group members. In part, they suggested that this may be because the feedback they received was aggregated across the group. That is, the feedback may have showed that conflict was high within the group, but did not give specifics as to which group members thought it was high, and who was perceived to have contributed to this level of conflict. More specific and goal-oriented feedback, directed to the appropriate participants (e.g., group

co-leaders versus group members) may prove to be more useful. Unfortunately, no other studies examining feedback to group co-leaders exist to examine this.

While the two studies on feedback interventions provided to group co-leaders provide conflicting results as to the usefulness of such interventions, Lambert and his colleagues have recently conducted several studies in which feedback is provided to individual therapists with positive results. Lambert, Whipple, Smart, Vermeersch, Nielsen, and Hawkins (2001) examined the effects of providing therapists with feedback regarding clients' change (or lack their of) on an outcome questionnaire that assessed intra-psychic functioning, interpersonal relationships, and social role performance. Participants were 609 clients seen at a university counseling center, and therapists were 16 doctoral-level staff psychologists, and 15 doctoral students and interns. Clients completed the outcome questionnaire at intake, and prior to each session. Each time the client completed the measure, therapists in the feedback (experimental) condition received a graphical representation of their clients' scores over time, which were color-coded for ease of interpreting. Outcome data for clients in the control condition were not given to therapists, and were simply entered into a database.

Clients were categorized by their progress as either "on track" or "not on track" based on their change in outcome questionnaire scores. "On track" clients were those who were rated as either making adequate progress or who were in the normal range of functioning throughout their therapy. "Not on track" clients were those who were not making adequate progress at some point in their therapy. Lambert et al. (2001) hypothesized that the feedback intervention would be most effective for those therapists of clients who were "not on track" at some point in their therapy. A 2 x 2 ANOVA

(feedback condition x progress categorization) confirmed this hypothesis. Clients who were not showing adequate improvement and whose therapists received this feedback had significantly lower outcome questionnaire scores (i.e., they showed more improvement) than those clients who were not showing adequate improvement and whose therapists did not receive feedback. There were no significant differences on outcome scores for "on track" clients whose therapists received the feedback on their progress versus those who did not. These results suggest that feedback interventions directed at therapists may be useful for improving client outcomes, especially for clients who are not making adequate progress.

Hawkins, Lambert, Vermeersch, Slade, and Tuttle (2004) also examined the effect of a feedback intervention on client outcomes in individual therapy. Using the same outcome measure and procedures, Hawkins et al. (2004) examined whether their were differences in client outcome among clients who received therapy as usual (i.e., no feedback), clients whose therapists received feedback, and clients whose therapists received feedback and who received feedback themselves. They found that clients in both feedback conditions were significantly more improved at the end of treatment than those who received therapy as usual. Those clients in the condition in which both they and their therapists showed the greatest level of improvement over time, suggesting that feedback directed at multiple participants (i.e., the therapist and the client) might be useful.

Summary of the literature on feedback interventions. While there are conflicting results as to the effectiveness of interventions directed at group co-leaders (Barlow et al., 1982; Davies et al., 2008), relatively little empirical work has been conducted to explore the potential of these types of interventions. However, there is

reason to believe that a specific, goal-oriented feedback intervention may be useful to group co-leaders (Barlow et al., 1982; Dies & Dies, 1993). Additionally, feedback interventions aimed at individual therapists have been found to improve client outcomes (Hawkins et al., 2004; Lambert et al., 2001). As such, there is potential for an intervention aimed at co-leaders of group interventions to have positive effects on group processes and outcomes. Taken with the team cognition literature showing that similarity in mental models is related to team performance and that similarity in mental models may be augmented or manipulated, an intervention aimed at increasing the team cognition of group co-leaders may possibly improve co-leader team performance (e.g., their creation of a productive group climate).

Chapter 3: Statement of the Problem

It is clear that little is known about the processes involved in co-leadership of group interventions (Fall & Menendez, 2002; Riva, Wachtel, & Lasky, 2004). As such, further research into these processes will enhance our understanding of the factors that lead to positive group processes and outcomes for these types of groups. While the literature on co-leader similarity remains equivocal as to whether co-leaders should be similar or different, there is evidence that similarity in co-leaders' mental models of their groups within a team lead to productive group climates (Miles & Kivlighan, 2008). This is consistent with the literature on team cognition, which shows that similarity in team members' mental models is related to team performance and effectiveness (e.g., Bonito, 2004; Espevik et al., 2006; Mathieu et al., 2000; Waller et al., 2004). Recently, the team cognition literature has begun to examine ways in which team cognition may be augmented in order to increase schema similarity, and thus team effectiveness (e.g., Cooke, 2005). One way to augment team cognition may be through an intervention that provides feedback to co-leaders about their own and their co-leader's mental models of their group members, and facilitates communication among team members about one another's mental models.

As such, the current study examined the effects of a feedback intervention designed to increase the similarity in co-leaders' mental models of their group members, as well as to improve their understanding of how their co-leader saw their group members. In the current study, "mental models" specifically refers to co-leaders' knowledge structures about relationships among group members to one another in terms of similarity (i.e., which group members does each co-leader see as similar to one

another, and which group members does the co-leader see as different from one another).

Because the content of these mental models was group members, the *content* of mental

models is identical for both co-leaders within a team. As such, similarity is defined as

similarity in *structure* of co-leaders' mental models.

Co-leader teams from intergroup dialogues were randomly assigned to either the

treatment (i.e., feedback) or control (i.e., no feedback) conditions. All co-leaders

completed similarity ratings of each possible pair of group members in their group after

each session (See Appendix C). Additionally, they provided the amount of time (in

minutes) they spent communicating with their co-leader in the week preceding their most

recent dialogue session, and completed four additional research-designed items about

their communication and working relationship with their co-leader (See Appendix E).

These items about the quantity and quality of communication among co-leader teams

served the purpose of monitoring the fidelity of the treatment. That is, the goal of these

items was to ensure that the co-leaders were spending time discussing their group and the

discussion questions [and feedback, for those co-leaders in the treatment condition], as

asked. Group members in all groups completed a measure of group climate (GCQ-S;

MacKenzie, 1983) and three researcher-designed items about how they thought their co-

leaders were working together (See Appendix B).

Co-leaders in the treatment condition were then given feedback about their own

and their co-leader's mental models of their group members after the completion of their

similarity ratings each week. This feedback took the form of graphical representations of

their both co-leaders' mental models based on their similarity ratings (i.e., Pathfinder

Network Analysis [Schvaneveldt, 1990] output). Mathieu et al. (2000) found that team

processes, such as communication, completely mediated the relationship between mental

model similarity and team performance. As such, the co-leaders in the treatment

condition were also provided with a set of questions to guide a discussion of this

feedback among themselves.

Co-leaders in the control condition did not receive the feedback, but were also

given a set of discussion questions in an effort to isolate the feedback intervention (versus

simply the communication between co-leaders) as the source of any effects on mental

model similarity or the group climate.

The development of the group climate was examined to determine whether the

treatment and control groups showed similar patterns of group climate development.

Group climate refers to the interpersonal environment within the group (MacKenzie,

1983), and will serve as a dependent variable in the current study. Group climate includes

the levels of Engagement, Avoidance, (i.e., avoiding discussing one's own or group

members problems), and interpersonal Conflict within the group. Group climate was

chosen as a dependent variable because it has been shown to be related to other group

outcome variables, and thus is an important immediate outcome in itself (e.g., Kivlighan

& Tarrant, 2001; Ogrodniczuk, & Piper, 2003). Because group climate is so important in

relation to other group member outcomes, effective co-leaders should foster the

development of a productive group climate. As such, co-leader team performance in the

current study was operationalized as the degree to which the group climate increased in

Engagement, decreased in Avoidance, and reflected an inverted U-shape pattern in

Conflict (i.e., lower conflict at the beginning of the group, higher conflict in the middle,

and lower conflict at the end of the group), as rated by the group members. Based on the

team cognition literature reviewed above, similarity in co-leader mental models should lead to better team performance, or the development of a productive group climate.

Based on theorizing in the team cognition literature (e.g., Rentsch & Hall, 2004), and prior research on similarity in co-leader teams' mental models in group interventions (Kivlighan et al., 2007; Miles & Kivlighan, 2008) suggesting that team member mental model similarity will increase over time, the first two hypotheses of the current study were as follows:

Hypothesis 1. Similarity in co-leaders' mental models of their group members would increase over the life of their group, for all groups.

Hypothesis 2. The slope of increase in similarity in co-leaders' mental models of their group members over time would be significantly greater for co-leader teams receiving the feedback intervention. This hypothesis served as a manipulation check for the intervention.

Previous research on group climate development over time suggests that Engagement typically increases over time (e.g., Ogrodniczuk & Piper, 2003; Tasca, Balfour, Ritchie, & Bissada, 2006), there are trends towards decreases in Avoidance (Kivlighan & Lilly, 1997; Tasca et al., 2006), and stability in Conflict (Kivlighan & Lilly, 1997; Ogrodniczuk & Piper, 2003). This pattern was seen specifically in previous research on team cognition in group interventions (Miles & Kivlighan, 2008). In the present study, intergroup dialogues served as the groups under study. Intergroup dialogues attempt to build relationships across groups that have typically had a history of tension between them. As such, Engagement (i.e., the importance of the group to the members, group cohesion, self-disclosure, and challenge and confrontation to promote

88

interpersonal learning; MacKenzie, 1983) within the group is important for fostering an atmosphere in which this goal can be met. At the same time, Avoidance of problems within the group could serve to perpetuate the tension between groups, rather than address it directly. Finally, some Conflict should be expected and desired within these groups. MacKenzie (1983) stated that Conflict "is important in promoting an atmosphere in which defenses can be challenged" (p. 166). This seems especially important in the intergroup dialogue situation. Intergroup dialogues follow a four stage model of development, including a stage in which group members are getting to know one another and developing a safe environment for dialogue, a stage in which commonalities and differences are explored, a stage in which "hot topics" are addressed, and a stage in which dialogue members move from dialogue to action together. It may be expected, then, that Conflict would be relatively low as intergroup dialogue members are getting to know one another in the first stage, that it would increase as commonalities and differences are explored and hot topics are discussed, and that it would decrease in the final stage as dialogue members begin to explore ways to move from dialogue to social action together. As such, Hypotheses Three through Five of the current study were as follows:

Hypothesis 3. Engagement would increase over time for all groups.

Hypothesis 4. Avoidance would decrease over time for all groups.

Hypothesis 5. Conflict would develop in an inverted U-shape pattern (i.e., Conflict would start low, increase in the middle of the group, and would decrease at the end of the group) over time for all groups.

The team cognition literature that suggests that similar mental models within a team lead to improved team performance (e.g., Bonito, 2004; Espevik et al., 2006; Mathieu et al., 2000; Miles & Kivlighan, 2008; Waller et al., 2004). Because group climate is related to group member outcomes (e.g., Kivlighan & Tarrant, 2001; Ogrodniczuk & Piper, 2003), the creation of a productive group climate should be a primary task of the co-leader team. As such, similarity in co-leaders mental models should lead to a productive group climate (i.e., one that is high in Engagement, low in Avoidance). This was reflected in Hypotheses Six and Seven of the current study:

> *Hypothesis 6.* Similarity in co-leaders' mental models of their group members would be positively related to levels of Engagement for all groups.

> *Hypothesis 7.* Similarity in co-leaders' mental models of their group members would be negatively related to levels of Avoidance for all groups.

Because the level of Conflict within intergroup dialogues is expected to develop in a non-linear fashion across the life of the intergroup dialogues, an additional research question was:

> How will similarity in co-leaders' mental models of their group members
>
> be related to the level of Conflict in the intergroup dialogues?

Finally, the team cognition literature suggests that team cognition may be augmented to improve team mental model similarity (e.g., Cooke, 2005). The literature on team cognition also suggests that team processes such as communication moderate the relationship between team mental model similarity and team performance (e.g., Mathieu et al, 2000; Bonito, 2004). The current intervention provided feedback to co-leaders around which to structure their communication about their group, in an attempt to

increase the similarity in how they saw their group members (i.e., their team mental model), and thus improve the co-leader team's performance (i.e., the extent to which they facilitate the development of a productive group climate). As such, Hypotheses Eight and Nine were as follows:

Hypothesis 8. The slope of increase in Engagement would be greater for groups in the treatment condition (i.e., groups whose co-leaders have received the intervention).

Hypothesis 9. The slope of decrease in Avoidance would be less for groups in the treatment condition (i.e., groups whose co-leaders have received the intervention).

Again, because Conflict was expected to develop in a non-linear fashion across the life of the intergroup dialogues, an additional research question was:

How will participation in the feedback intervention be related to levels of Conflict in the intergroup dialogues?

Additional research questions examined included whether co-leaders' perceptions of the quantity and quality of communication they had with their co-leader changed as a function of session and/or condition, and whether group members' perceptions of their co-leaders' working relationship changed as a function of session and/or condition. Analyses were run to examine whether co-leaders' perceptions of (1) the amount of time they communicated with their co-leader prior to their most recent session, (2) whether they felt that they communicated effectively within their co-leader team prior to their most recent session, (3) whether they feel they spent sufficient time communicating with their co-leader about their group prior to the most recent session, (4) whether they

thought their co-leader was aware of their conceptualization of their group, and (5) whether they thought that they were aware of their co-leader's conceptualization of their group changed as a function of session (i.e., changed over time) or treatment condition (whether perceptions of co-leaders who received the feedback intervention were significantly different from those co-leaders who did not receive the intervention).

Finally, group members' perceptions of the extent to which their co-leaders (1) shared a similar conceptualization of their group, (2) worked together toward common goals, and (3) worked well together were examined to determine whether group members perceptions of their co-leaders' working relationship changed as a function of the session number (i.e., changed over time) or treatment condition (i.e., whether their co-leaders received the feedback intervention).

Chapter 4: Method

Participants

     Groups. Co-leaders from 32 intergroup dialogues, 24 at the University of Maryland, College Park, and 8 from the University of Illinois at Urbana-Champaign were invited to participate in the current study with their dialogue groups. Because the current study examined an intervention for co-leader teams, both co-leaders had to agree to participate in order for their group to be included. Co-leader teams from eight intergroup dialogues, seven at the University of Maryland, College Park and one at the University of Illinois at Urbana-Champaign, agreed to participate in the current study. Intergroup dialogues are based on Allport's (1954) contact hypothesis that intergroup contact under a common goal is one way to reduce intergroup prejudice. A recent meta-analysis of 515 studies on intergroup contact has supported Allport's hypothesis that intergroup contact does indeed reduce intergroup prejudice (Pettigrew & Tropp, 2006). As such, "college-based intergroup dialogues are a particular effort aimed at engaging participants from diverse backgrounds in exploring commonalities and differences in their social identities, learning about social inequalities, and envisioning communities that are more multicultural and socially just" (p. 4, Nagda, 2006).

     The intergroup dialogue programs at both universities together individuals from social identity groups who have typically had a history of conflict or tension among them (University of Maryland, n.d.), for example People of Color and White People. The goals of intergroup dialogues include (1) providing sustained communication within and across social identity groups, (2) fostering the development of critical consciousness about personal and social identities and social systems, and (3) creating the opportunity to build

bridges across social identity groups and work toward social justice together (e.g., Zuniga, Nagda, Chesler, & Cytron-Walker, 2007; Zuniga, Nagda, & Sevig, 2002).

The topics of the intergroup dialogues included two dialogues on race and ethnicity (i.e., People of Color and White People), two dialogues on socioeconomic class, one dialogue on gender (i.e., Women and Men), one dialogue on sexual orientation (i.e., LGBT People and Heterosexual People), one dialogue on religion (i.e., Religious/Secular), and one dialogue on affiliation with a university Greek system (i.e., "Greek/non-Greek). The intergroup dialogues at both Universities are open to all undergraduate students and meet for two hours per week for each of seven consecutive weeks. Students at both universities received one credit hour for participation in an eight-week intergroup dialogue.

Group members. Group members were undergraduate enrolled in one of the intergroup dialogue groups during the Fall 2008, Spring 2009, Fall 2009, or Spring 2010 semesters, The number of students enrolled in each dialogue ranged from 12 to 18 ($M =$ 14; $SD = 1.80$), for a total of 113 possible group member participants. All students enrolled in each of the eight dialogues were invited to participate, and 65 students (57.52%) agreed to participate. As an incentive to participate, participants were entered into a raffle to win a small prize (a gift card to a local or online retailer), or were offered extra credit in their dialogue course.

Of the 65 participants, 57 reported their age. The age range was 18 to 34 years of age ($M = 21.08$, $SD = 3.33$). Thirty-two participants in the sample identified as male (49.23%), 27 identified as female (41.54%), and 6 did not provide their gender identification (9.23%). Thirty-two participants identified as Caucasian/White (49.23%),

13 identified as African American/Black (20.00%), seven identified as "Other" (10.77%), six identified as Asian American (9.23%), one identified as Latino/Latina (1.54%), and six did not identify their race or ethnicity (9.23%). Fifty-three of the participants identified as heterosexual (81.54%), three identified as bisexual (4.62%), three identified as gay (3.08%), one identified as "Other" sexual orientation (1.54%), and six did not identify their sexual orientation (9.23%). (The total percentage equals 100.01 due to rounding error.) Additionally, 23 of the participants were enrolled as juniors (35.39%), 19 were enrolled as seniors (29.23%), 12 were enrolled as sophomores (18.46%), five were enrolled as freshman (7.69%), and six did not indicate their year in school (9.23%).

Across groups and weeks, there was a total of 455 possible group member observations (65 group members times seven weeks). Two groups (one with 14 students and one with 15 students) met for only six sessions due to weather-related school closings, bringing the number of total possible observations down to 426. Two hundred and fourteen observations were collected from these 65 participants across groups and weeks, for a group member response rate of 50.23%.

Group co-leaders. Group co-leaders in the current study were the 12 facilitators of the eight intergroup dialogues described above (four of the co-leaders led two dialogues each). Intergroup dialogue co-leaders at both Universities were graduate students, staff, or faculty who were trained in dialogue facilitation and who have expertise in the content areas relevant to their dialogues (University of Maryland, n.d.). The intergroup dialogue co-leaders underwent intensive training by through their respective intergroup dialogue programs prior to the start of their groups. The co-leaders represented the social identities of the participants of the groups that they facilitated (e.g.,

95

for the "LGBT/Heterosexual People" group, one leader identified as a member of the LGBT community and the other identified as heterosexual). Again, as an incentive to participate, participants were entered into a raffle to win a small prize (a gift card to a local or online retailer).

Of these 12 co-leader participants, 11 reported their age. The age range was 26 to 60 years of age ($M = 33.67$, $SD = 9.01$). Eight co-leaders in the sample identified as female (66.67%) and 4 identified as male (33.33%). Seven co-leaders identified as Caucasian/White (58.33%), 4 identified as African American/Black (33.33%), and one identified as Asian American (8.33%). (The total percentage equals 99.99% due to rounding error). Nine of the co-leaders identified as heterosexual (75.00%), two identified as gay (16.67%), and one identified as "Other" sexual orientation (8.33%). Additionally, ten of the participants held master's degrees as their highest degree (83.33%), one held a bachelor's degree as her or his highest degree (8.33%), and one held a high school diploma as her or his highest degree (8.33%). (The total percentage equals 99.99% due to rounding error).

Across groups and weeks, there was a total of 112 possible co-leader observations (Two co-leaders per group times eight groups times seven weeks). Two groups met for only six sessions due to weather-related school closings, bringing the number of total possible observations down to 108. Seventy-five observations were collected across co-leaders, groups, and weeks for a total response rate of 69.44%. However, an index in similarity in co-leaders' mental models could only be calculated when both co-leaders in a co-leader team completed the group member similarity ratings for a particular session. Therefore, the total number of possible data points regarding co-leader mental model

similarity was 54 (six groups times seven weeks plus two groups times six weeks). Due to weeks when one or both co-leaders did not provide similarity ratings, the total number of data points regarding co-leader mental model similarity that could be calculated was 27 (50.00%).

Measures

      Demographics questionnaire. Both group co-leaders and group members were administered a demographic questionnaire that assessed age, gender, race/ethnicity, sexual orientation, and highest degree held or current year in school in order to characterize the samples. A copy of this questionnaire is included as Appendix A.

      Group member measures. In addition to the demographics questionnaire, group members completed the Group Climate Questionnaire-Short Form, and items asking about their perception of the co-leader working relationship. A copy of the group member measures are included as Appendix B.

      Group Climate Questionnaire-Short Form (GCQ-S). Group climate was assessed using the GCQ-S (MacKenzie, 1983). The GCQ-S is a 12-item measure that represents a shortened version of the 32-item Group Climate Questionnaire-Long Form (GCQ-L; MacKenzie, 1981). The GCQ-S was designed by "selecting the high-loading items" (MacKenzie, 1981, p. 161) from the GCQ-L, and contains three scales: Engagement, Avoidance, and Conflict. All items are answered on "a seven-point Likert scale, ranging from 'not at all' to 'extremely'" (MacKenzie, 1983, p. 165). An instrument development study on the GCQ-S (MacKenzie, 1983) found that the interscale correlation between Avoidance and Engagement is -.44, the interscale correlation between Conflict and Engagement is -.18, and the interscale correlation between Conflict

and Avoidance is .30, indicating that these scales are measuring different, though related, aspects of group climate. Additionally, previous research has found good reliability of this measure, with coefficient alphas of .94 for the Engagement scale, .92 for the Avoidance scale, and .88 for the Conflict scale (Kivlighan & Goldfine, 1991).

The *Engagement* scale includes five items that "reflect the importance of the group for the members and a sense of closeness between them" (i.e., "The members felt what was happening was important and there was a sense of participation;" Mackenzie, 1983, p. 165), which is related to cohesion within the group. This scale also includes an item reflecting "Rogerian dimensions" (i.e., "The members liked and cared about each other;" MacKenzie, 1983, p. 165). Self-disclosure (i.e., "The members revealed sensitive personal information or feelings"), "cognitive understanding of the meaning of behavior" (i.e., "The members tried to understand why they do the things they do, tried to reason it out;" MacKenzie, 1983, p. 165), and "challenge and confrontation [among group members] to promote interpersonal learning" (MacKenzie, 1983, p. 165) are also assessed through this scale.

The *Avoidance* scale centers "on the idea of avoidance of responsibility by the members for their own change process" (MacKenzie, 1983, pp. 165-166). As such, it contains three items that assess "avoidance of problems...dependence on the leader...high adherence to group expectations...[and] interpersonal distance" (MacKenzie, 1983, p. 166). These items included "The members avoided looking at important issues going on between themselves," "The members depended on the group leader(s) for direction," and "The members appeared to do things the way they thought would be acceptable to the group." The *Conflict* scale "deals with interpersonal conflict and distrust" (MacKenzie,

1983, p. 166) among group members. The four items that make up the Conflict scale are "There was friction and anger between the members," "The members were distant and withdrawn from each other," "The members rejected and distrusted each other," and "The members appeared tense and anxious."

The GCQ-S has been used in previous research to examining the relationship between group leadership and group climate and outcomes (e.g., Kivlighan & Tarrant, 2001; Ogrodniczuk & Piper, 2003), and research examining the development of group climate in intergroup dialogues (e.g., Miles & Kivlighan, 2008). It takes approximately five minutes to complete, and was be completed by the group members following each session.

Co-leader working relationship items. Each week group members were asked three researcher-designed questions to assess their perceptions of their co-leaders' working relationship. Specifically, they were asked to rate on a 7-point Likert scale (1 = *not at all* and 7 = *extremely*) the extent to which they felt that their co-leaders (1) shared a similar conceptualization of their group, (2) were working toward common goals, and (3) worked well together in their most recent dialogue session. After the last session, group members were asked to rate the same three dimensions as they perceived them over the course of the entire semester.

Group co-leader measures. Group co-leaders were asked to complete similarity ratings of each possible pair of group members in their group, and to complete items regarding the quantity and quality of communication they had with their co-leader between dialogues.

Group member similarity ratings. In order to assess the mental models of group

co-leaders, each co-leader were asked to make similarity ratings of each possible pair of

group members within their group on a seven-point Likert scale (1 = *very dissimilar* and

7 = *very similar*). Co-leaders were specifically *not* given criteria upon which to make

their similarity ratings, in order to obtain an unbiased picture of the ways in which they

are conceptualizing their own groups on their own. Co-leaders were asked to individually

complete this measure following each session. A copy of this measure is included as

Appendix C.

Quantity and quality of co-leader communication. Each week, group co-leaders

responded to seven items that asked about the amount of time (in minutes) that they spent

communicating with their co-leaders about their group between sessions. Additionally,

each co-leader was asked to respond to four items on a 7-point Likert scale (1 = *not at all*

and 7 = *extremely*) that asked whether she or he felt that (1) her or his co-leader team

communicated effectively in the week prior to their most recent session, (2) her or his co-

leader team spent sufficient time discussing their group in the week prior to their most

recent session, (3) she or he believes her or his co-leader is aware of her or his own

conceptualization of their group, and (4) she or he believes she or he is aware of her or

his co-leader's conceptualization of their group. The purpose of these items was to serve

as a check to monitor the fidelity of the intervention. That is, these items were meant to

ensure that co-leaders from both conditions were actually spending time communicating

with one another between sessions, and allowed for the examination of whether their

were differences in the quantity or quality of communication between co-leaders in the

treatment versus control conditions that may account for any differences in group climate between groups. A copy of these items is included as Appendix E.

Procedure

The design for the current study was a longitudinal, experimental design in which co-leader teams were randomly assigned to either the treatment condition (i.e., receiving the feedback intervention) or the control condition (i.e., not receiving the feedback intervention). The experimental design of the current study was chosen in order to provide strong evidence for a *causal* relationship between co-leader similarity and co-leader team performance.

Groups met for two hours each week, for seven consecutive weeks. All group members were asked to complete the measures via an internet-based survey as soon as possible following each session. Co-leaders were specifically asked to complete the measures within two days of their most recent session in order to provide time to send those co-leaders in the treatment condition feedback about their mental models and to give the co-leaders time to examine and discuss that feedback prior to their next session. Emails with a link to the internet-based surveys were sent to individual participants after each meeting of their intergroup dialogue. Reminder emails were sent to all participants who had not completed the measures after about two days of their most recent session, and again about two days later. All participants will complete an informed consent form and the demographic questionnaire following their first session.

Treatment condition. Once the co-leaders completed their similarity ratings of their group members, these data were compiled into a separate similarity matrix, for each co-leader, for each session. These matrices were then individually subjected to a

Pathfinder Network Analysis (as detailed below), which provided a graphical network representation of how each co-leader organized information about their group members after that session (i.e., it provides a graphical representation of their mental model of their group members for that session). Specifically, group members were represented as individual "nodes" in the network, and the nodes representing group members who were rated most similarly were connected by a line (See Appendix D for an example of Pathfinder Network output from this study).

Group co-leaders in the treatment condition were then sent the graphical representation of their mental model (i.e., the Pathfinder Network Analysis output described above) and that of their co-leader in a PDF file via email, along with an explanation to help them interpret it. They were asked to examine both their own and their co-leader's mental models of their group members, and to set aside time (i.e., about 15 minutes) to discuss this feedback within their co-leader team prior to their next session. In order to provide more control over the content and quality of the communication between the co-leaders regarding their mental models of their group members, co-leaders were also provided with a set of questions to guide their discussion of their mental models of their group members (See Appendix F).

Control condition. Co-leaders in the control condition completed the similarity ratings of their group members following each session, and these data were analyzed via Pathfinder Network Analysis in the same manner as those of the co-leaders in the treatment condition. Co-leader teams in the control condition did not receive the output of their Pathfinder Analysis as feedback. However, they were also provided with a discussion prompt to guide their discussion of their group. Specifically, they were asked

to discuss what they each felt was the most important incident that happened in their most recent session, why, and their reactions to this incident. The purpose of these questions was to provide co-leaders in the control condition a similar format for communicating about their group in order to isolate whether any possible differential changes in mental model similarity or group climate among the different conditions were, in fact, due to the feedback intervention rather than just communication among co-leaders.

Chapter 5: Data Analysis

Group Member Data

Mean scores and standard deviations of the GCQ-S and researcher designed items asking group members to rate the extent to which they felt their co-leaders (1) shared a similar conceptualization of their group, (2) were working together toward common goals, and (3) worked well together are reported in Table 1.

Reliability of the GCQ-S scores assessed in two ways. First, Chronbach's alphas for inter-item reliability for the Engagement, Avoidance, and Conflict scales were each examined. Chronbach's alphas for Engagement, Avoidance, and Conflict were .71, .36, and .77, respectively. These values were similar to those found in other research on intergroup dialogues; Miles and Kivlighan (2008) found alphas of .76, .50, and .69, for Engagement, Avoidance, and Conflict, respectively. However, these coefficient alphas were somewhat lower than those found in research on other groups. For example, Kivlighan and Goldfine (1991) found coefficient alphas of .94 for the Engagement scale, .92 for the Avoidance scale, and .88 for the Conflict scale, in a study involving interpersonal growth groups.

Second, because the data was gathered over time as part of a two-level model, the intra-class correlation coefficients represent another measure of reliability and were also examined. The intra-class (in this case, intra-group) correlation coefficient is a statistic that "describes the proportion of the total outcome variation that lies 'between' [groups]," (p. 96, Singer & Willett, 2003). The intra-class correlation coefficient indicates the total variation in group climate scores (for each subscale) that is attributable to differences among groups. For the current study, intra-class correlation coefficients were .43, .12,

104

and .33 for Engagement, Avoidance, and Conflict, respectively. These measures of the

proportion of between group variance on the GCQ-S are similar to those found in

previous research on group climate in intergroup dialogues (Miles & Kivlighan, 2008).

Means and standard deviations for each subscale of the GCQ-S (Avoidance,

Conflict, and Engagement) were calculated for each member, for each session. These

mean scores were then aggregated by group for each session, in order to provide a mean

score for Avoidance, Conflict, and Engagement for each group, for each session. These

mean scores then served as the dependent variable in the subsequent growth curve

analyses.

Group Co-Leader Data

Co-leader similarity ratings of their group members were entered into a matrix,

such that an individual similarity matrix was constructed for each co-leader, for each

session. The first column and row of each matrix were labeled with each group member's

name from that co-leader's group. The cells within the matrix contained the that co-

leader's similarity rating for the pair of group members indicated in the row and column

of that cell. These matrices were then analyzed using Pathfinder Network Analysis

(Schvaneveldt, 1990).

Pathfinder Network Analyses. The similarity matrices described above were

entered into the Pathfinder Network Analysis (Schvaneveldt, 1990) program. As

described above, Pathfinder Network Analysis reveals cognitive structures (i.e., mental

models) in the form of a network representation, in which the most closely related nodes

(in the case of the current study, group members) are linked (See Appendix D for a

sample network representation). For the current study, group members that were judged

105

to be most similar to one another by the co-leader for that session were directly linked in the co-leader's Pathfinder network.

Two parameters, q and r, determine the properties of the Pathfinder network. The q-parameter, an integer value between 2 and n-1, where n is equal to the number of nodes (i.e., concepts, or in this case, group members), "constrains the number of indirect proximities examined" (Schvaneveldt, 1990). The r-parameter "defines the metric used for computing the distance of paths," and is a real number between 1 and infinity (Schvaneveldt, 1990). The minimum-cost network (i.e., the network with the least number of links, or the most parsimonious network), has a q-parameter of n-1, and an r-parameter of infinity (∞). The parameters for the current study were set to produce the most parsimonious network for each co-leader, at each session.

In order to examine the similarity of co-leaders' mental models of their group members following each session, the Pathfinder networks were then compared within co-leader teams for each session. Pathfinder Network Analysis (Schvaneveldt, 1990) provides a measure of similarity for pairs of networks, calculated as follows: (the number of links in common in the two networks)/(the total number of links in both networks - the number of links in common in the two networks). This index of network similarity may range from 0 (indicating that the two networks share no links in common) to 1.0 (indicating that the networks being compared share all possible links in common). In the current study, the similarity index ranged from .20 to .50 ($M = .32$; $SD = .08$), which was somewhat lower than similarity ratings found in previous research on co-leader mental model similarity in intergroup dialogue co-leader teams. Specifically, Miles and Kivlighan found mean similarity ratings of .46. However, the standard deviation in that

study was more than twice as large (.20) as that in the current study, so there was more consistency with regard to similarity across groups and weeks in the current study. Means and standard deviations for the similarity index by condition and session are included as Table 2.

This similarity index served as the dependent variable in the growth curve analyses that follow examining Hypotheses 1 and 2 (i.e., examining whether similarity in mental models changed as a function of session and treatment condition, respectively), and as the independent variable in the growth curve analyses examining Hypotheses 6 and 7 (i.e., examining whether Engagement and Avoidance were effected by the level of similarity in co-leaders' mental models, respectively) and the research question regarding the relationship between co-leader mental model similarity and Conflict in the intergroup dialogues.

Growth Curve Analyses

Growth curve analysis is a form of hierarchical linear modeling that allows researchers to examine individual (or in the case of the current study, co-leader team or group) change over time (Raudenbush & Bryk, 2002). In growth curve analysis, change over time can be represented in a two-level model, in which multiple observations over time are nested within the individual (or in this case, group; Raudenbush & Bryk, 2002). In the current study, the Level 1 model represented each co-leader team or group's change over time in the dependent variable (similarity in mental models or group climate, respectively) in "an individual growth trajectory that depends on a unique set of parameters," (Raudenbush & Bryk, 2002). The Level 2 model then used these individual growth parameters as outcome variables, which may depend on some group- or team-

level characteristics. A two-level model of this form, then, allows for the examination of within co-leader team or group change (Level 1) and between co-leader team or group change (Level 2).

In the current study, growth curve analyses were used to assess: (1) whether similarity in co-leaders' mental models of their group members changed over the course of the groups, and if so, how (i.e., Hypothesis 1); (2) if participation in the feedback intervention differentially predicted the level of co-leader similarity (i.e., Hypothesis 2; This also served as a manipulation check of the feedback intervention), (3) whether the group climate variables changed over the course of the groups, and if so, how (i.e., Hypotheses 3, 4, and 5); (4) if similarity in co-leaders' mental models of their group members predicted any of the group climate variables (i.e., Hypotheses 6 and 7, and the research question regarding the relationship between co-leader mental model similarity and Conflict); and (5) if participation in the feedback intervention predicted differential change in any of the group climate variables (i.e., Hypotheses 8 and 9, and the research question regarding the relationship between participation in the feedback intervention and Conflict). For all analyses, level of co-leader similarity was centered around the mean, so that intercepts represented mean levels of co-leader similarity rather than similarity at Session 0.

Chapter 6: Results

Gamma coefficients, standard errors, and *t*-ratios for all of the growth curve analyses are provided in Tables 4, 5, and 6.

Co-Leader Mental Model Similarity

Gamma coefficients, standard errors, and *t*-ratios for the growth curve analyses of co-leader mental model similarity are provided in Table 4. In order to partition the variance in co-leader mental model similarity, a completely unconditional two-level model was run. The Level 1 model that was:

$$Y_{ti} = \pi_{0i} + \varepsilon_{ti}$$

where Y_{ti} represents similarity in co-leader mental models of their group for the co-leader team of group i at time t, π_{0i} represents the co-leader team of group i's mean level of similarity in co-leader mental models of their group members, and ε_{ti} represents error in prediction.

The Level 2 model that was used was:

$$\pi_{0i} = \beta_{00} + r_{0i}$$

where β_{00} represents the overall mean level of similarity in mental models for all co-leader teams and r_{0i} represents error.

Sigma-squared and tau were examined to determine the proportion of within group (sigma-squared) and between groups (tau) variance for this analysis. Sigma-squared for this analysis was .004, indicating that within group variance (i.e., between session variance) accounted for 80.00% of the total variance (percentage of within group variance accounted for is equal to sigma-squared divided by sigma squared plus tau). Tau for this analysis was .001, indicating that between group variance accounted for 20.00%

of the total variance (percentage of between group variance accounted for is equal to tau divided by sigma squared plus tau).

Co-leader mental model similarity by session. In order to examine Hypothesis 1, that similarity in mental models within co-leader teams would increase over time, a growth curve analysis was run in which similarity served as the dependent variable and session served as the independent variable. The Level 1 model that was used was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(\text{session})_{ti} + \varepsilon_{ti}$$

where Y_{ti} represents similarity in co-leader mental models of their group for the co-leader team of group i at time t, π_{0i} represents the co-leader team of group i's mean level of similarity in co-leader mental models of their group members, π_{1i} represents the rate of change (i.e., slope) across time in similarity for the co-leader team of group i, (session)$_{ti}$ represents the session number at time t for the co-leader team of i, and ε_{ti} represents error in prediction.

The Level 2 model that was used was:

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

where β_{00} represents the overall mean initial level of similarity in mental models for all co-leader teams, r_{0i} represents error, β_{10} represents the overall mean initial linear rate of change in similarity in mental models for all the co-leader teams, and r_{1i} represents error.

A t test for the slope term corresponding to change in similarity by session was not significant, $\gamma = .008$, $t(6, 6) = .745$, indicating that, contrary to Hypothesis 1, there was no significant change in co-leader mental model similarity over time. Means and

standard deviations for co-leader mental model similarity by session and condition are included in Table 2.

Co-leader mental model similarity by condition. In order to examine Hypothesis 2, that participation in the feedback intervention (i.e., treatment condition) would differentially effect the development of similarity in co-leaders' mental models of their group members over time, a growth curve analysis was run in which similarity served as the dependent variable, session served as the independent variable at Level 1, and treatment condition served as the independent variable at Level 2. The Level 1 model that was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(\text{session})_{ti} + \varepsilon_{ti}$$

where Y_{ti} represents similarity in co-leader mental models of their group for the co-leader team of group i at time t, π_{0i} represents the co-leader team of group i's mean level of similarity in co-leader mental models of their group members, π_{1i} represents the rate of change (i.e., slope) across time in similarity for the co-leader team of group i, (session)$_{ti}$ represents the session number at time t for the co-leader team of group i, and ε_{ti} represents error in prediction.

The Level 2 model that was used was:

$$\pi_{0i} = \beta_{00} + \beta_{01}(\text{Condition})_i + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(\text{Condition})_i + r_{1i}$$

where β_{00} represents the overall mean initial level of similarity in co-leaders' mental models of their group members for all co-leader teams, β_{01} represents the effect of participation in the feedback intervention on the overall mean initial level of similarity in co-leaders' mental models of their group members for all co-leader teams, (Condition)$_i$

111

represents whether the co-leader team of group i participated in the feedback intervention or not, β_{10} represents the overall mean linear rate of change in similarity in co-leaders' mental models of their group members for all co-leader teams, and r_{0i} represents error. β_{11} represents the effect of participation in the feedback intervention on the overall mean change trajectories of similarity in co-leaders' mental models of their groups for all co-leader teams, and r_{1i} represents error.

A t test for the slope term corresponding to Condition did not reach significance, $\gamma = .014$, $t(5, 5) = .326$, indicating that, contrary to Hypothesis 2, participation in the feedback intervention did not differentially effect the development of similarity in co-leaders' mental models of their group members over time.

Group Climate Variables

In order to partition the variance in each of the group climate variables, three completely unconditional two-level models were run. Gamma coefficients, standard errors, and t-ratios for the growth curve analyses of the group climate variables are provided in Table 4. Each of the group climate variables (Engagement, Avoidance, and Conflict) served as the dependent variable for one of these analyses. The Level 1 model that was used for all three of the analyses was:

$$Y_{ti} = \pi_{0i} + \varepsilon_{ti}$$

where Y_{ti} represents level of the group climate variable group i at time t, π_{0i} represents group i's mean level of the group climate variable, and ε_{ti} represents error in prediction.

The Level 2 model that was used in all three analyses was:

$$\pi_{0i} = \beta_{00} + r_{0i}$$

where β_{00} represents the overall mean level of the group climate variable all groups and r_{0i} represents error.

Sigma-squared and tau were examined to determine the proportion of within group (sigma-squared) and between groups (tau) variance for each of these analyses. Sigma-squared for was .259, .294, and .474 for the analyses of Engagement, Avoidance, and Conflict, respectively. This indicates that that within group variance accounted for 56.67% of the total variance in Engagement, 88.02% of the total variance in Avoidance, and 67.14% of the total variance in Conflict (percentage of within group variance accounted for is equal to sigma-squared divided by sigma squared plus tau). Tau was .198, .040, and .232 for the analyses of Engagement, Avoidance, and Conflict, respectively. This indicates that between group variance accounted for 43.33% of the total variance in Engagement, 11.98% of the total variance in Avoidance, and 32.86% of the total variance in Conflict (percentage of between group variance accounted for is equal to tau divided by sigma squared plus tau).

Group climate by session: Engagement and Avoidance. In order to examine Hypotheses 3 and 4 (that Engagement would increase over time and that Avoidance would decrease over time, respectively) two growth curve analyses were run. Engagement and Avoidance each served as a dependent variable in one of these growth curve analyses, and session served as the independent variable at Level 1 in both analyses. For both of these analyses, the Level 1 model that was used was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(\text{session})_{ti} + \varepsilon_{ti}$$

where Y_{ti} represents the group climate variable for group i at time t, π_{0i} represents group i's mean level of the group climate variable, π_{1i} represents group i's rate of change (i.e.,

slope) across time, (session)$_{ti}$ represents the session number at time t for group i, and ε_{ti} represents error in prediction.

The Level 2 model that was used for both analyses was:

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

where β_{00} represents the overall mean initial level of the group climate variable for all groups, r_{0i} represents error, β_{10} represents the overall mean initial linear rate of change in the group climate variable for all groups, and r_{1i} represents error.

Engagement. Consistent with Hypothesis 3, a t test for the slope term corresponding to session was significant, $\gamma = .118$, $t(7, 7) = 3.08$, $p = .019$, indicating that Engagement significantly increased by session.

Avoidance. Consistent with Hypothesis 4, a t test for the slope term corresponding to session was significant, $\gamma = -.121$, $t(7, 7) = -2.799$, $p = .027$, indicating that Avoidance significantly decreased by session.

Group climate by session: Conflict. In order to examine Hypothesis 5 (that Conflict would develop in an inverted U-shaped pattern over time) a separate growth curve analysis was run in which Conflict served as the dependent variable and session served as the independent variable at Level 1. The Level 1 model that was used was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(\text{session})_{ti} + \pi_{2i}(\text{session})^2{}_{ti} + \varepsilon_{ti}$$

where Y_{ti} represents the group climate variable for group i at time t, π_{0i} represents group i's mean level of the group climate variable, π_{1i} represents group i's linear rate of change (i.e., slope) across time, (session)$_{ti}$ represents the session number at time t for group i, π_{2i}

represents the mean quadratic rate of change in group climate across time, and ε_{ti} represents error in prediction.

The Level 2 model that was used was:

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$\pi_{2i} = \beta_{20} + r_{2i}$$

where β_{00} represents the overall mean initial level of the group climate variable for all groups, r_{0i} represents error, β_{10} represents the overall mean initial linear rate of change in the group climate variable for all groups, r_{1i} represents error, β_{20} represents the overall mean quadratic rate of change in the group climate variable for all groups, and r_{2i} represents error.

Contrary to Hypothesis 5, a *t* test for the slope of the term corresponding to the quadratic rate of change in Conflict was not significant, $\gamma = -.022$, $t(7, 7) = -.532$, $p = .611$, indicating no significant quadratic change in the level of Conflict by session. Additionally, a *t* test for the slope term corresponding to the linear rate of change in Conflict did not reach significance, $\gamma = .106$, $t(7, 7) = .295$, $p = .777$, indicating that there was no significant linear change in Conflict by session.

Group climate by co-leader mental model similarity. In order to examine Hypotheses 6 and 7 (that the level of similarity in co-leaders' mental models within a co-leader team would be related to higher levels of Engagement and lower levels of Avoidance, respectively), and the research question concerning the relationship between co-leader mental model similarity and the levels of Conflict in intergroup dialogues, three growth curve analyses were run. Engagement, Avoidance, and Conflict each served as a

dependent variable in one of these growth curve analyses, session and similarity served as the independent variables at Level 1 for all analyses. The Level 1 model that was used for group i at time t was for all three analyses was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(\text{session})_{ti} + \pi_{2i}(\text{similarity})_{ti} + \varepsilon_{ti}$$

where Y_{ti} represents the group climate variable for group i at time t, π_{0i} represents group i's mean level of the group climate variable, π_{1i} represents group i's rate of change (i.e., slope) across time, $(\text{session})_{ti}$ represents the session number at time t for group i, π_{2i} represents group i's true rate of change (i.e., slope) in similarity, $(\text{similarity})_{ti}$ represents the level of co-leader mental model similarity, and ε_{ti} represents error in prediction.

The Level 2 model that was used for all three analyses was:

$$\pi_{0i} = \beta_{00} + + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

$$\pi_{2i} = \beta_{20} + r_{2i}$$

where β_{00} represents the overall mean initial level of the group climate variable all groups, , β_{10} represents the overall mean initial linear rate of change in the group climate variable for all groups by session, r_{1i} represents error, β_{20} represents the overall mean linear rate of change in the group climate variable for all groups by level of co-leader mental model similarity, and r_{2i} represents error.

Engagement. Contrary to Hypothesis 6, A t test for the slope term corresponding to similarity was not significant, $\gamma = -1.862$, $t(6, 6) = -.719$, $p = .499$, indicating that the level of similarity in co-leader mental models was not related to the level of Engagement in the group.

Avoidance. Contrary to Hypothesis 7, A *t* test for the slope term corresponding to similarity was not significant, $\gamma = .318$, $t(6, 6) = .185$, $p = .860$, indicating that the level of similarity in co-leader mental models was not related to the level of Avoidance in the group.

Conflict. In regards to the research question concerning the relationship between co-leader mental model similarity and the level of Conflict in intergroup dialogues, a *t* test for the slope term corresponding to similarity was not significant, $\gamma = 2.090$, $t(6, 6) = 1.391$, $p = .214$. This indicated that the level of similarity in co-leader mental models was not significantly related to the level of Conflict in the group.

Because Miles and Kivlighan (2008) found that co-leader mental model similarity after a given session was positively related to Engagement in the following session, three addition growth curve analyses were run to examine whether co-leader mental model similarity after a session predicted Engagement, Avoidance, or Conflict in the following session. The Level 1 and Level 2 models were the same as those described above except that the outcome variables were Engagement, Avoidance, and Conflict *in the following session*, for the three analyses, respectively.

Engagement in the next session. Contrary to the findings of Miles and Kivlighan (2008), A *t* test for the slope term corresponding to similarity was not significant, $\gamma = -2.986$, $t(6, 6) = -1.391$, $p = .214$, indicating that the level of similarity in co-leader mental models after a session was not related to the level of Engagement in the next session.

Avoidance in the next session. A *t* test for the slope term corresponding to similarity was not significant, $\gamma = .140$, $t(6, 6) = .103$, $p = .922$, indicating that the level of

similarity in co-leader mental models after a session was not related to the level of Avoidance in the next session.

Conflict in the next session. A t test for the slope term corresponding to similarity was not significant, $\gamma = .137$, $t(6, 6) = .104$, $p = .921$ indicating that the level of similarity in co-leader mental models after a session was not related to the level of Conflict in the next session.

Group climate by condition. In order to examine Hypotheses 8 and 9 (that the increase in Engagement would be greater for groups in the treatment condition, and that the decrease in Avoidance would be greater for groups in the treatment condition, respectively), and the research question concerning the relationship between participation in the feedback intervention and levels of Conflict in the intergroup dialogues, three growth curve analyses were run. Engagement, Avoidance, and Conflict each served as a dependent variable in one of these growth curve analyses, and session served as the independent variable at Level 1 and Condition served as the independent variable at Level 2 in all three analyses. The Level 1 model for all three analyses that was used was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(\text{session})_{ti} + \varepsilon_{ti}$$

where Y_{ti} represents the group climate variable for group i at time t, π_{0i} represents group i's mean level of the group climate variable, π_{1i} represents group i's rate of change (i.e., slope) across time, $(\text{session})_{ti}$ represents the session number at time t for group i, and ε_{ti} represents error in prediction.

The Level 2 model that was used for all three analyses was:

$$\pi_{0i} = \beta_{00} + \beta_{01}(\text{Condition})_i + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(\text{Condition})_i + r_{1i}$$

where β_{00} represents the overall mean initial level of the group climate variable all groups, β_{01} represents the relationship between Condition and the initial level of the group climate variable, (Condition)$_i$ represents whether the co-leader team of group i participated in the feedback intervention or not, r_{0i} represents error, β_{10} represents the overall mean initial linear rate of change in the group climate variable for all the groups by session, β_{11} represents the relationship between condition and the change in the group climate variable over time, and r_{1i} represents error.

Engagement. A *t* test of the slope term corresponding to Condition did not reach significance, $\gamma = -.149$, $t(6, 6) = -.400$, $p = .702$, indicating, contrary to Hypothesis 8, that participation in the feedback intervention did not differentially affect the development of Engagement within the group climate.

Avoiding. A *t* test of the slope term corresponding to Condition did not reach significance, $\gamma = .033$, $t(6, 6) = .141$, $p = .893$, indicating, contrary to Hypothesis 9, that participation in the feedback intervention did not differentially affect the development of Avoidance within the group climate.

Conflict. In regards to the research question regarding the relationship between participation in the feedback intervention and the levels of Conflict in the intergroup dialogues, a *t* test of the slope term corresponding to Condition did not reach significance, $\gamma = -.452$, $t(6, 6) = -1.148$, $p = .295$, indicating that participation in the feedback intervention did not differentially affect the development of Conflict within the group climate.

Co-Leader Reports of Quantity and Quality of Communication with Their Co-Leader

Analyses were conducted on the research-designed items asking co-leaders to indicate the (1) amount of time they communicated with their co-leader prior to their most recent session (referred to as *amount of time* below), (2) whether they felt that they communicated effectively within their co-leader team prior to their most recent session (referred to as *communicated effectively* below), (3) whether they feel they spent sufficient time communicating with their co-leader about their group prior to the most recent session (referred to as *sufficient time* below), (4) whether they thought their co-leader was aware of their conceptualization of their group (referred to as *co-leader aware* below), and (5) whether they thought that they were aware of their co-leader's conceptualization of their group (referred to as *aware of co-leader* below). The purpose of these analyses was to determine whether co-leaders' responses to these items varied as a function of time and of treatment condition. Means and standard deviations for these items by session are included as Table 3. Gamma coefficients, standard errors, *t*-ratios, and degrees of freedom for the analyses involving co-leaders' reports of the quality and quantity of communication with their co-leaders are included in Table 5.

In order to partition the variance in amount of time, communicated effectively, sufficient time, co-leader aware, and aware of co-leader, five completely unconditional two-level models were run. Each of the research-designed quality/quantity of communication variables served as the dependent variable for one of these analyses. The Level 1 model that was used for all five of the analyses was:

$Y_{ti} = \pi_{0i} + \varepsilon_{ti}$

where Y_{ti} represents level of the quality/quantity of communication variable, π_{0i}

represents group i's mean level of the quality/quantity of communication variable, and ε_{ti}

represents error in prediction.

The Level 2 model that was used in all five analyses was:

$$\pi_{0i} = \beta_{00} + r_{0i}$$

where β_{00} represents the overall mean level of the quality/quantity of communication

variable all groups and r_{0i} represents error.

Sigma-squared and tau were examined to determine the proportion of within

group (sigma-squared) and between groups (tau) variance for each of these analyses.

Sigma-squared for was 930.344, .907, 1.086, .712, and .675 for the analyses of amount of

time, communicated effectively, sufficient time, co-leader aware, and aware of co-leader,

respectively. This indicates that that within group variance accounted for 50.65% of the

total variance in amount of time, 89.54% of the total variance in communicated

effectively, 85.71% of the total variance in sufficient time, 66.67% of the total variance in

co-leader aware, and 58.85% of the total variance in aware of co-leader. Tau was

906.498, .106, .181, .356, and .472 for the analyses of amount of time, communicated

effectively, sufficient time, co-leader aware, and aware of co-leader, respectively. This

indicates that that between group variance accounted for 49.35% of the total variance in

amount of time, 10.46% of the total variance in communicated effectively, 14.29% of the

total variance in sufficient time, 33.33% of the total variance in co-leader aware, and

41.15% of the total variance in aware of co-leader.

Quality and quantity of communication by session. In order to examine

whether co-leaders' perceptions of the quantity and quality of communication they had

with their co-leader in the week preceding their most recent dialogue session changed

over time, five growth curve analyses were run. Amount of time, communicated

effectively, sufficient time, co-leader aware, and aware of co-leader each served as a

dependent variable in one of these growth curve analyses, and session served as the

independent variable at Level 1 in all five analyses. For all five of these analyses, the

Level 1 model that was used was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(\text{session})_{ti} + \varepsilon_{ti}$$

where Y_{ti} represents the quality/quantity of communication variable, π_{0i} represents group

i's mean level of the quality/quantity of communication variable, π_{1i} represents group i's

rate of change (i.e., slope) across time, $(\text{session})_{ti}$ represents the session number at time t

for group i, and ε_{ti} represents error in prediction.

The Level 2 model that was used was for all five analyses:

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

where β_{00} represents the overall mean initial level of the quality/quantity of

communication variable for all groups, r_{0i} represents error, β_{10} represents the overall

mean initial linear rate of change in the quality/quantity of communication variable for all

groups, and r_{1i} represents error.

Amount of time. A t test for the slope term corresponding to session was not

significant, $\gamma = -4.017$, $t(6, 6) = -1.277$, $p = .249$, indicating that the amount of time co-

leaders reported communicating about their group prior to their most recent dialogue

session did not change significantly over time.

Communicated effectively. A *t* test for the slope term corresponding to session was not significant, $\gamma = -.114$, $t(6, 6) = -1.222$, $p = .268$, indicating that the extent to which co-leaders felt they were communicating effectively about their group prior to their most recent dialogue session did not change significantly over time.

Sufficient time. A *t* test for the slope term corresponding to session was not significant, $\gamma = .009$, $t(6, 6) = .085$, $p = .935$, indicating that the extent to which co-leaders felt they were sufficiently communicating about their group prior to their most recent dialogue session did not change significantly over time.

Co-leader aware. A *t* test for the slope term corresponding to session was significant, $\gamma = .243$, $t(6,6) = 3.42$, $p = .017$, indicating that the extent to which co-leaders believed their co-leader was aware of their conceptualization increased over time.

Aware of co-leader. A *t* test for the slope term corresponding to session was significant, $\gamma = .191$, $t(6,6) = 2.59$, $p = .041$, indicating that the extent to which co-leaders believed they were aware of their co-leader's conceptualization increased over time.

Quality and quantity of communication by Condition. In order to examine whether co-leaders' perceptions of the quantity and quality of communication they had with their co-leader in the week preceding their most recent dialogue session changed as a function of treatment condition, five growth curve analyses were run. Amount of time, communicated effectively, sufficient time, co-leader aware, and aware of co-leader each served as a dependent variable in one of these growth curve analyses, and session served as the independent variable at Level 1 in all five analyses. For all five of these analyses, the Level 1 model that was used was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(\text{session})_{ti} + \varepsilon_{ti}$$

where Y_{ti} represents the quality/quantity of communication variable, π_{0i} represents group

i's mean level of the quality/quantity of communication variable, π_{1i} represents group i's

rate of change (i.e., slope) across time, (session)$_{ti}$ represents the session number at time t

for group i, and ε_{ti} represents error in prediction.

The Level 2 model that was used was for all five analyses:

$$\pi_{0i} = \beta_{00} + \beta_{01}(\text{Condition})_i + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(\text{Condition})_i + r_{1i}$$

where β_{00} represents the overall mean initial level of the quality/quantity of

communication variable all groups, β_{01} represents the relationship between Condition and

the initial level of the quality/quantity of communication variable, (Condition)$_i$ represents

whether the co-leader team of group i participated in the feedback intervention or not, r_{0i}

represents error, β_{10} represents the overall mean initial linear rate of change in the

quality/quantity of communication variable for all the groups by session, β_{11} represents

the relationship between Condition and the change in the quality/quantity of

communication variable over time and r_{1i} represents error.

Amount of time. A t test for the slope term corresponding to Condition was not

significant, $\gamma = 27.194$, $t(5, 5) = 1.032$, indicating that the amount of time co-leaders

reported communicating about their group prior to their most recent dialogue session did

not vary significantly by treatment condition.

Communicated effectively. A t test for the slope term corresponding to Condition

was not significant, $\gamma = -.072$, $t(5, 5) = -.131$, $p = .902$, indicating that the extent to which

co-leaders felt they were communicating effectively about their group prior to their most

recent dialogue session did not vary significantly by treatment condition.

Sufficient time. A *t* test for the slope term corresponding to Condition was not significant, $\gamma = -.153$, $t(5, 5) = -.259$, $p = .806$, indicating that the extent to which co-leaders felt they were sufficiently communicating about their group prior to their most recent dialogue session did not vary significantly by treatment condition.

Co-leader aware. A *t* test for the slope term corresponding to Condition was not significant, $\gamma = .942$, $t(5, 5) = 1.696$, $p = .150$, indicating that the extent to which co-leaders believed their co-leader was aware of their conceptualization did not vary by treatment condition.

Aware of co-leader. A *t* test for the slope term corresponding to Condition was not significant, $\gamma = .956$, $t(6, 6) = 1.596$, $p = .171$, indicating that the extent to which co-leaders believed they were aware of their co-leader's conceptualization did not vary by treatment condition.

Group Member Perceptions of Co-Leader Working Relationship

Additional analyses were run on the three researcher-designed items on that asked group members to rate the extent to which they believed (1) their co-leaders shared a similar conceptualization of their group (referred to as *similar conceptualization* below), (2) their co-leaders appeared to be working toward common goals (referred to as *common goals* below), and (3) their co-leaders worked well together (referred to as *worked well* below). The purpose of these analyses was to examine whether group members' perceptions of their co-leaders' working relationship changed over time, and whether their were significant differences in group members' perceptions on these items based on whether their co-leaders received the feedback intervention or not. Means and standard deviations for these items by session are included in Table 1. Gamma coefficients,

125

standard errors, *t*-ratios, and degrees of freedom for the analyses involving group member perceptions of their co-leaders' working relationship are included in Table 6.

In order to partition the variance in similar conceptualization, common goals, and worked well three completely unconditional two-level models were run. Each of the research-designed working relationship items served as the dependent variable for one of these analyses. The Level 1 model that was used for all three of the analyses was:

$$Y_{ti} = \pi_{0i} + \varepsilon_{ti}$$

where Y_{ti} represents level of the working relationship variable, π_{0i} represents group *i*'s mean level of the working relationship variable, and ε_{ti} represents error in prediction.

The Level 2 model that was used in all three analyses was:

$$\pi_{0i} = \beta_{00} + r_{0i}$$

where β_{00} represents the overall mean level of the working relationship variable all groups and r_{0i} represents error in prediction.

Sigma-squared and tau were examined to determine the proportion of within group (sigma-squared) and between groups (tau) variance for each of these analyses. Sigma-squared for was .195, .171, and .191 for the analyses of similar conceptualization, common goals, and worked well, respectively. This indicates that that within group variance accounted for 77.69% of the total variance in similar conceptualization, 56.62% of the total variance in common goals, and 63.88% of the total variance in worked well. Tau was .056, .131, and .108 for the analyses of similar conceptualization, common goals, and worked well, respectively. This indicates that between group variance accounted for 22.31% of the total variance in similar conceptualization, 43.38% of the total variance in common goals, and 36.12% of the total variance in worked well.

Group member perceptions of co-leader working relationship by session. In order to examine whether group member perceptions of their co-leaders' sharing a conceptualization of their group, working together toward common goals, and working well together changed over time, three growth curve analyses were run. Shared conceptualization, common goals, and worked well each served as a dependent variable in one of these growth curve analyses, and session served as the independent variable at Level 1 in all three analyses. For all three of these analyses, the Level 1 model that was used was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(\text{session})_{ti} + \varepsilon_{ti}$$

where Y_{ti} represents the working relationship variable, π_{0i} represents group i's mean level of the working relationship variable across time, π_{1i} represents group i's rate of change (i.e., slope) across time, $(\text{session})_{ti}$ represents the session number at time t for group i, and ε_{ti} represents error in prediction.

The Level 2 model that was used was for all three analyses:

$$\pi_{0i} = \beta_{00} + r_{0i}$$

$$\pi_{1i} = \beta_{10} + r_{1i}$$

where β_{00} represents the overall mean initial level of the working relationship variable for all groups, r_{0i} represents error, β_{10} represents the overall mean initial linear rate of change in the working relationship variable for all groups, and r_{1i} represents error.

Shared conceptualization. A t test of the slope term corresponding to the session did not reach significance, $\gamma = .003$, $t(7, 7) = .074$, $p = .943$, indicating that group members' perceptions of the extent to which their co-leaders shared a similar conceptualization of their group did not significantly change over time.

Common goals. A *t* test of the slope term corresponding to the session did not reach significance, $\gamma = -.006$, $t(6, 6) = -.173$, $p = .868$, indicating that group members' perceptions of the extent to which their co-leaders were working together toward common goals did not significantly change over time.

Worked well. A *t* test of the slope term corresponding to the session did not reach significance, $\gamma = -.013$, $t(6, 6) = -.314$, $p = .763$, indicating that group members' perceptions of the extent to which their co-leaders worked well together did not significantly change over time.

Group member perceptions of co-leader working relationship by condition. In order to examine whether group members perceptions of whether their co-leaders shared a similar conceptualization of their group, worked together toward common goals, and worked well together, three growth curve analyses were run. Similar conceptualization, common goals, and worked well each served as a dependent variable in one of these growth curve analyses, and session served as the independent variable at Level 1 and Condition served as the independent variable at Level 2 in all three analyses.

The Level 1 model for all three analyses that was used was:

$$Y_{ti} = \pi_{0i} + \pi_{1i}(\text{session})_{ti} + \varepsilon_{ti}$$

where Y_{ti} represents the working relationship variable, π_{0i} represents group *i*'s mean level of the working relationship variable, π_{1i} represents group *i*'s rate of change (i.e., slope) across time, $(\text{session})_{ti}$ represents the session number at time *t* for group *i*, and ε_{ti} represents error in prediction.

The Level 2 model that was used was for all three analyses:

$$\pi_{0i} = \beta_{00} + \beta_{01}(\text{Condition})_i + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(\text{Condition})_i + r_{1i}$$

where β_{00} represents the overall mean initial level of the working relationship variable all

groups, β_{01} represents the relationship between Condition and the initial level of the

working relationship variable, $(\text{Condition})_i$ represents whether the co-leader team of

group i participated in the feedback intervention or not, r_{0i} represents error, β_{10} represents

the overall mean linear rate of change in the working relationship variable for all the

groups by session, β_{11} represents the relationship between Condition and the change in

the working relationship variable over time and r_{1i} represents error.

Similar conceptualization. A t test of the slope term corresponding to Condition

did not reach significance, $\gamma = -.103$, $t(6, 6) = -.458$, $p = .663$, indicating that whether

their co-leaders' received the feedback intervention did not differentially affected group

members' perceptions of whether their co-leaders shared a similar conceptualization of

their group.

Common goals. A t test of the slope term corresponding to Condition did not

reach significance, $\gamma = -.021$, $t(6, 6) = -1.148$, $p =$ indicating that whether their co-leaders'

received the feedback intervention did not differentially affected group members'

perceptions of whether their co-leaders were working together toward common goals.

Worked well together. A t test of the slope term corresponding to Condition did

not reach significance, $\gamma = -.202$, $t(6, 6) = -.734$, $p = .491$, indicating that whether their

co-leaders' received the feedback intervention did not differentially affected group

members' perceptions of whether their co-leaders worked well together.

Chapter 7: Discussion

The current study attempted to build on the previous research on the co-leadership of group interventions, team cognition, and feedback in psychotherapy by examining the effectiveness of a feedback intervention designed to augment the team cognition of teams of co-leaders of group interventions (i.e., increase the similarity in mental models of their group members). Team cognition research has shown that teams perform better when their mental models are more similar (e.g., Bonito, 2004; Espevik et al., 2006; Mathieu et al., 2000; Waller et al., 2004). This finding has been found to be true in teams of co-leaders of group interventions as well. Miles and Kivlighan (2008) found that in similarity in the mental models of co-leaders of group interventions was related to a group climate that was higher in engagement and lower in avoidance. Additionally, the literature on team cognition suggests that similarity in mental models within a team is something that can be manipulated or augmented, and that interventions aimed at the communication between team members may be one avenue for doing so (e.g., Cooke, 2005; Mathieu et al., 2000). The current study sought to examine whether team cognition could be also augmented in group intervention co-leader teams through an intervention that involved communication between co-leaders, specifically about their mental models of their group members.

Recent research on feedback interventions in psychotherapy has shown that feedback interventions directed at psychotherapists may improve client outcomes (e.g., Hawkins et al., 2004; Lambert et al., 2001). As such, the current study examined whether an intervention that provided feedback to group co-leader teams about their mental models of their group members and asked them to discuss this feedback with one another

would promote the development of more similar mental models among the co-leaders over time, thereby allowing the co-leaders to work together toward common goals and, ultimately, positively impacting the development of the group climate in intergroup dialogue groups. Group climate has been shown to be related to other group member outcomes (e.g., Ogrodniczuk & Piper, 2003), so an intervention that can foster the development of a productive group climate can have important implications, especially in time-limited group interventions.

Group Climate Over Time

In the present study, the Engagement and Avoidance aspects of the group climate developed as predicted: Engagement increased and Avoidance decreased across the life of the intergroup dialogues, confirming Hypotheses 3 and 4. However, there was no significant quadratic change in Conflict over time, as predicted by Hypothesis 5. Additionally, there was no significant linear change in Conflict over time. Previous research on group climate development in group interventions has also found trends toward increased Engagement (e.g., Ogrodniczuk & Piper, 2003; Tasca, Balfour, Ritchie, & Bissada, 2006), decreased Avoidance (Kivlighan & Lilly, 1997; Tasca et al., 2006) and consistent levels of Conflict (Kivlighan & Lilly, 1997; Ogrodniczuk & Piper, 2003). It is especially notable that this pattern of group climate development is the same as that found in other research specifically examining group climate in intergroup dialogues (Miles & Kivlighan, 2008; Miles & Kivlighan, in press).

Intergroup dialogues bring together individuals from social identity groups that have typically had a history of tension or conflict between them (e.g., People of Color and White People; University of Maryland, n.d.), with the goals of (1) providing

sustained communication within and across social identity groups, (2) fostering the

development of critical consciousness about personal and social identities and social

systems, and (3) creating the opportunity to build bridges across social identity groups

and work toward social justice together (e.g., Zuniga, Nagda, Chesler, & Cytron-Walker,

2007; Zuniga, Nagda, & Sevig, 2002). In order to achieve the goals of providing

sustained communication and the opportunity to build bridges across social identity

groups, it is necessary for group members to feel like the group is important to them, that

there is a sense of participation, and that group members are self-disclosing and self-

reflective, as measured by the Engagement scale of the GCQ-S. As such, the observed

increase in Engagement is expected and desired in this type of group intervention.

Similarly, because intergroup dialogues deal with sensitive "hot button" issues

(e.g., heterosexism, racism, religion, and sexism) in an effort to develop critical

consciousness about personal and social identities and social systems, it is important for

group members to look at important issues going on between themselves (i.e., the

relationships between individuals of different social identity groups), and to be genuine in

discussing their experiences and feelings, as reflected in the Avoidance scale of the GCQ-

S. That is, in order to get the most out of their intergroup dialogue experience, group

members need to confront these issues that have brought them together rather than

avoiding them because they make them uncomfortable or because they do not want to

offend the other members of their intergroup dialogue. The hypothesized and observed

decrease in Avoidance supports this reasoning.

Finally, because one of the main purposes of intergroup dialogues is to bring

together individuals from social identity groups that have typically had a history of

132

tension or conflict between them, some level of friction, anger, tension, anxiety, or distrust should be expected and desired, as it indicates that the group members are truly engaging in the difficult work of the dialogue. It may seem that it would be desired for the level of Conflict to vary over time (e.g., be higher in the middle stages of the dialogues when "hot topics" are being discussed), however, the level of Conflict in the current study remained constant over the course of the groups. This is consistent with previous research on group climate in intergroup dialogues (e.g., Miles & Kivlighan, 2008). For many undergraduate students who enroll in an intergroup dialogue, this is the first time they have confronted these social issues, especially in a setting that includes individuals from social identity groups that are different from their own. As such, it may be that the seven-week time-frame for intergroup dialogues is not enough time to overcome tension or distrust of other social identity groups that has developed historically between groups and over the lives of the individual students. Future research might examine whether longer dialogues (e.g., dialogues that last for an entire academic year) might help reduce these feelings. Alternatively, future research might examine whether participation in a dialogue has an effect on individuals' perceptions of conflict in future intergroup settings.

Co-Leader Mental Model Similarity Over Time

Research on the development of similar mental models has been equivocal. While some research has found team mental model similarity to increase over time (e.g., Kivlighan et al., 2007), and some research has found non-significant trends toward the development of similar mental models among team members (e.g., Edwards et al., 2006; Miles & Kivlighan, 2008), other research has found either no changes in mental model

similarity over time (e.g., Mathieu et al., 2000) or even decreases in mental model similarity over time (e.g., Levesque et al., 2001).

Based on theorizing in the team cognition literature (e.g., Rentsch & Hall, 1994) and previous research in group interventions showing significant increases in (Kivlighan et al., 2007), or non-significant trends toward increases in (Miles & Kivlighan, 2008) similarity in co-leader teams' mental models over time, it was hypothesized that similarity in co-leader mental models of their group members would increase over time in the current study. However, the level of co-leader mental model similarity in the present study did not significantly change over time. This lack of significant change in team member mental model similarity is consistent with the findings of Edwards et al. (2006), Mathieu et al. (2000), and Miles and Kivlighan (2008). In order to explain their lack of significant change in team member mental models over time, both Edwards et al. (2006) and Mathieu et al. (2000) suggested that the lifespan of the teams in their studies may not have been long enough to significantly impact mental model similarity (i.e., teams in these studies lasted for hours or days). In contrast, the co-leader teams in the Kivlighan et al. (2007) study that found novice co-leaders' mental models became more similar to that of their expert co-leader/instructor were examined over a 16-week time frame. This amount of time is more than twice as much as the amount of time that co-leader teams worked together in the current study. Given that co-leader teams are often coming together for the first time to lead their dialogues, it may be expected that co-leader mental model similarity would start out low, as co-leaders are getting to know about on another, their task, and their group. As such, it may also be that significant positive change in co-leader mental model similarity in intergroup dialogue co-leader teams would take more

than seven weeks to develop. Future research may look at the impact of increased time working together as a team on the development of co-leader mental models in intergroup dialogue co-leader teams. This may include looking at the impact of lengthening the dialogues themselves (e.g., to one full semester, or 16 weeks, as in the Kivlighan et al. study), or looking at co-leaders who co-lead more than one dialogue together over the course of different semesters.

Alternatively, Levesque et al. (2001) actually found a significant *decrease* in mental model similarity among team members over time. They concluded that this decrease in mental model similarity may reflect increased specialization by task of team members over time. The nature of co-leading an intergroup dialogue does not involve specialization by either co-leader in any specific tasks, and tasks are generally shared equally among co-leaders, so this may explain why there was not a significant decrease in mental model similarity over time in the current study.

Additionally, given the nature of intergroup dialogues, it may be that there are certain dimensions upon which co-leader mental model similarity would be desirable, and other dimensions upon which dissimilarity in mental models would be desirable. For example, similarity in co-leaders cognitions about their roles as co-leaders or their goals for the group may be beneficial, whereas some dissimilarity in worldview may be beneficial for the group. Future research may examine co-leader mental model similarity in different dimensions to determine when similarity in co-leader mental models may be desirable, and when dissimilarity may be desirable.

Co-Leader Mental Model Similarity by Condition

Based on the team cognition literature suggesting that team cognition may be augmented (e.g., Diedrich, Freeman, Entin, Weil, & MacMillan, 2005; Henning, Smith, & Korbelak, 2005; & Kiekel, 2005), it was hypothesized that the feedback intervention in the current study would serve to augment the team cognition of the co-leader teams in the treatment condition. That is, it was thought that the feedback about their mental models would serve as an aid in co-leaders developing similar mental models over time. The examination of this hypothesis served as a manipulation check of the intervention. Contrary to the hypothesis, there was no significant effect of treatment condition on co-leader mental model similarity.

Co-leaders in the current study were not provided with a definition of "similarity," in order to provide an unbiased picture of how they were conceptualizing their group members (i.e., to examine how they were conceptualizing their group members without prompting by the researcher with a definition or examples as to how they might conceptualize their group members). They were also not asked to provide the dimensions on which they based their similarity ratings throughout the study, as it was thought that this might comprise an intervention in itself. It may be that co-leaders continued to make their similarity ratings based on different criteria throughout the study, which would explain the lack of change in similarity in mental models over time, indicating that the feedback intervention was not effective.

The Pathfinder output that was provided as feedback to the co-leader teams in the treatment condition was likely novel to all co-leaders. An explanation of how to interpret the feedback was provided to all co-leaders in the treatment condition, along with

discussion questions to help them in interpreting the feedback, but it may still be that this feedback was difficult to decipher or make meaningful. In order to examine this, future research might ask co-leaders the extent to which they understood the Pathfinder output, and the extent to which they were able to make meaning from the output relevant to their specific group members. Additionally, future research might ask co-leaders to provide the dimensions upon which they made their similarity ratings. In order to avoid the risk of having them do this influencing their ratings in subsequent sessions, co-leaders might be provided with all of their Pathfinder output again at the end of their seven-week dialogues and asked to examine it and indicate how they might have been making their similarity ratings each week.

Co-Leader Mental Model Similarity and Group Climate

Research in team cognition has generally found that similarity in team members' mental models is positively related to team performance (e.g., Bonito, 2004; Espevik et al., 2006; Mathieu et al., 2000; Waller et al., 2004). Similarly, recent research on mental model similarity in the mental models of co-leader teams in group interventions has found that the level of engagement for a session is negatively related to levels of similarity in co-leaders teams' mental models following that session, and that similarity in co-leaders mental models is positively related to engagement in the following session and negatively related to avoiding two sessions later (Miles & Kivlighan, 2008). Miles and Kivlighan hypothesized that when engagement in a session is low, co-leaders may have spent more time discussing their group afterwards, and this was reflected in higher similarity in mental models. This effect of similarity is then reflected in higher engagement in the following dialogue session. Similarly, they found that similarity in

mental models was negatively related to avoiding two sessions later. Because group leadership has been found to be related to group climate and, in turn, group member outcomes (Kivlighan & Tarrant, 2001), Miles and Kivlighan interpreted this finding to mean that similarity in co-leader mental models led to improved performance of the co-leader team, as reflected in a more engaging and less avoiding group climate. As such, it was hypothesized in the current study that co-leader mental model similarity would be related to a productive group climate over time (i.e., one that is higher in engagement and lower in avoidance), replicating the results of the Miles and Kivlighan study.

However, in the current study, co-leader mental model similarity following a session was not significantly related to any of the group climate variables (Engagement, Avoidance, or Conflict) either in the same or the following session. One possible reason for the difference in the findings of the current study and the Miles and Kivlighan (2008) study may be seen in an examination of the means and standard deviations in the co-leader mental model similarity index across the two studies. The mean co-leader similarity index in the current study was .32, and the standard deviation was .08. In the Miles and Kivlighan (2008) study, the mean co-leader similarity index was .46 and the standard deviation was .20. Given the higher mean in the Miles and Kivlighan (2008) study, it may be that there is a certain threshold for mental model similarity at which point it starts to impact the climate of the group that was not met in the current study. Given the much higher standard deviation in the Miles and Kivlighan study, it may also be that the findings relating similarity to group climate were due to a few outlying co-leader teams with very high similarity. Alternatively, the between group variance in the current study for similarity in group co-leader mental models was low. It may be that

there was not enough between group variance to account for significant changes in the group climate variables. Future research should continue to examine similarity in co-leaders' mental models to determine what the average similarity is between co-leaders, and whether there is a minimum threshold of similarity that must be crossed before it has an impact on group climate or other group outcomes.

Feedback Intervention and Group Climate

Recent research has found that providing feedback to therapists is related to improved client outcomes (e.g., Hawkins et al., 2004; Lambert et al., 2001). As such, there is reason to believe that a feedback intervention similar to the one in the current study might impact group member outcomes. However, little empirical research has been conducted on feedback interventions in group interventions. In one of the few empirical studies on a feedback intervention aimed at group leaders, Barlow et al. (1982) provided feedback to group leaders regarding their leadership style in a "simulated" group prior to their actual group experience. They found significant impacts of the feedback intervention on co-leader style, but did not find significant impacts on group member outcomes. Davies et al. (2008) conducted a study in which group co-leaders were provided with feedback on group member ratings of the group climate, which were then used for discussion within the group. Contrary to their hypotheses, they found no significant impact of this feedback intervention on either the development of the group climate or group member outcomes.

Similarly, the current study did not find any significant impact of the feedback intervention on the development of the group climate. While this finding is consistent with the other research finding no effect of feedback interventions in group co-leadership

(Barlow et al., 1982; Davies et al., 2008), it is inconsistent with the finds about feedback interventions aimed at individual therapists seeing individual clients (e.g., Hawkins et al., 2004; Lambert et al., 2001).

The feedback in the current study was related to co-leaders' perceptions of the relationships among individual group members, whereas the feedback in the Davies et al. (2008) study was related to the group as a whole, and the feedback in the Barlow et al. (1982) study was completely disconnected from the actual group that the co-leaders led. None of these studies, including the current study, provided co-leaders feedback relevant to specific, individual group members. Feedback on this more specific level would be similar to the type of feedback provided to individual therapists of individual clients in the feedback studies by Lambert and colleagues that have found significant, positive effects of feedback interventions (e.g., Hawkins et al., 2004; Lambert et al., 2001). Future research might examine the impact of feedback about individual group members to co-leaders of group interventions on group process and outcomes.

It may also be that, because group interventions involve multiple relationships, that the feedback that co-leaders of group interventions receive should reflect this complexity. That is, it may be that co-leaders need to receive feedback on multiple levels, for example, about the group as a whole, about their working relationship, and about the experiences of individual group members.

Additionally, Lambert et al. (2004) found that feedback interventions were most effective in cases that were "off track" (i.e., clients who were not making adequate progress at some point in their therapy). The development of the group climate in the present study followed the predicted trajectory with regards to Engagement and

Avoidance (i.e., Engagement increased and Avoidance decreased across time), so there was no indication that any of the groups in the current study were "off track" at any given time. It may be that the level of similarity in mental models that co-leaders began with was sufficient for the dialogues to remain "on track," so there was no need for the co-leaders to work toward developing more similar mental models (either explicitly or implicitly). Future research might include other outcome measures across time that might indicate whether an intergroup dialogue is "off track" to see if there is a differential effect of providing feedback to co-leaders of these dialogue groups versus those that are "on track."

Group Member and Co-Leader Perceptions of the Co-Leader Working Relationship

In order to examine whether group members' perceptions of their co-leaders' working relationship varied as a function of session or treatment condition, additional items were included in the current study that asked group members to rate the extent to which they believed their co-leaders shared a similar conceptualization of their group, were working together toward common goals, and worked well together in co-leading their dialogue (See Appendix B). Group member ratings of these aspects of their co-leaders' working relationships did not significantly vary as a function of either session or condition. An examination of the means for each of these items across time (see Table 3) shows that group member ratings on these items were consistently high across sessions. It may be that the lack of any significant effect of session or condition may be the result of a ceiling effect. That is, group members rated their co-leaders as high on all of these aspects of their relationship from the beginning of their dialogues, and across conditions. Though group members were told that their items were confidential and would not be

shared with their co-leaders, group members may still have been hesitant to rate their co-leaders low on any of these items, as their co-leaders did grade them at the end of their dialogue experience. Alternatively, it may be that these researcher-designed items were not sensitive enough to pick up on differences in group members' perceptions of their co-leaders' working relationship, or that these items did not capture aspects of the relationship that are perceivable to group members. Similarly, it may be that co-leaders worked on their relationship outside of the dialogue session itself, and so any differences in opinion or difficulties within the relationship would not be evident to the group members themselves. Because the modeling of a healthy interpersonal relationship is one of the presumed benefits of the co-leader modality in group interventions (e.g., Bailis & Adler, 1974; Davis & Lohr, 1971; Dick, Lessler, & Whiteside, 1981; Lundin & Aronov, 1952; McGee & Schulman, 1970; Yalom & Leszcz, 2005), future research might examine whether there are other aspects of the co-leader working relationship that are evident to group members, and that are related to group member outcomes.

Additionally, co-leaders' perceptions of the quantity and quality of the communication between themselves and their co-leaders were assessed through seven-researcher designed items (See Appendix E). Specifically, co-leaders were asked to indicate the amount of time (in minutes) they spent communicating with their co-leader about their group, the extent to which they felt they communicated effectively with their co-leader about their group, the extent to which they felt they spent sufficient time communicating with their co-leader about their group, the extent to which they believed their co-leader was aware of their conceptualization of their group, and the extent to

which they believed they were aware of their co-leaders' conceptualization of their group in the week preceding their most recent dialogue.

Co-leader ratings on these items did not vary significantly as a function of session or treatment condition, with one exception: co-leaders' perceptions of the extent to which they believed their co-leader was aware of their conceptualization of their group and the extent to which they believed they were aware of their co-leaders' conceptualization of their group varied significantly by session. Specifically, co-leaders believed that their co-leader became more aware of their conceptualization of their group over time and that they became more aware of their co-leaders' conceptualization over time, regardless of treatment condition. This finding is interesting given that this was not reflected in the mental model similarity scores (i.e., the mental model similarity scores were not significantly different over time). It appears that co-leaders believe that they are coming to more similar conceptualizations of their group as they work together, even though this may not be the case. Future research might examine whether the perception that they have a similar conceptualization of their group has any impact on how co-leaders function as a team. For example, it may be that when co-leaders believe that they are conceptualizing things similarly, they will not talk as explicitly about how they are conceptualizing their group members, and may ask fewer questions about how their co-leader is conceptualizing their group members. This may partly explain the lack of an actual increase in similarity indices in the current study over time.

Strengths and Limitations

The current study builds on theory and research in team cognition, co-leadership, and feedback interventions in counseling and psychotherapy. The longitudinal and

experimental design represents a major strength of the current study. Another strength is the use of hierarchical linear modeling takes into account the nested nature of the current data (i.e., sessions are nested within groups).

However, there are several limitations of the current study that should be noted. First, the participation rate in the current study was low. Due to constraints from the intergroup dialogue programs and institutional review boards, neither co-leaders nor group members were required to participate in the current research. As such, the number of groups in the current study was constrained by the number of groups in which both co-leaders agreed to participate in the research. Co-leaders from 32 dialogues were invited to participate, and only eight co-leader teams agreed to participate. A variety of factors may have accounted for this low participation rate. During the time that the current study was conducted, faculty and staff at both universities were facing furloughs due to state and university budget concerns. As such, many co-leaders were hesitant to take on an additional responsibility given the reduced amount of hours they were allowed to work. Additionally, all co-leaders of intergroup dialogues at both universities do so in addition to their other full-time responsibilities at their respective university, and often for little or no pay. It may be that the co-leaders who opted not to participate did not have the additional time to commit to a research project, given that they were already committing to the extra task of leading their dialogue. Given these constraints, the sample of co-leaders who elected to participate in the current study may not reflect the overall population of intergroup dialogue co-leaders. For example, it may be that the co-leaders who opted to participate are those with a particular interest or investment in intergroup dialogue pedagogy. Future research needs to examine co-leadership of intergroup

dialogues and the impact of feedback interventions in samples that are randomly drawn from the population of co-leader teams and can therefore be considered representative of the population.

Similarly, group members were not required to participate, and only 57.52% of the students enrolled in the dialogues participated. Therefore those students who opted to participate may not have been representative of the entire population of intergroup dialogue group members. It may be that the group members who elected to participate had different perceptions of the climate of the group than those who did not. Mean ratings of Engagement were near the high end of the scale, and ratings of Avoidance and Conflict were near the low end of the scale, which may be an artifact of the group members not being randomly selected from the entire population. This may be especially true with regards to the Avoidance subscale of the GCQ-S, for which there was low between group variability (between group variability was higher for both Engagement and Conflict). Future research may examine group climate development and feedback interventions with group members randomly selected from the population of students enrolled in intergroup dialogues.

The low reliability of the Avoidance scale both in terms of the intraclass correlation coefficient (i.e., between group variability) and Cronbach's alpha represents another limitation of the current study. These low reliability scores are similar to those found in other research on intergroup dialogues that has used the GCQ-S (i.e., Miles & Kivlighan, 2008). This may be because the GCQ-S is a measure that was developed for use in psychotherapy groups and it may not accurately represent the construct of Avoidance as it appears in intergroup dialogues. For example, the item "The members

depended on the group leader(s) for direction" from the Avoidance scale may not reflect avoidance in intergroup dialogues as it may in psychotherapy groups because the co-leaders of intergroup dialogues are expected to provide some level of direction (e.g., co-leaders provide a syllabus, readings, and activities to guide the dialogue). As such, an area for future research may be the development of a measure of group climate that more accurately captures the construct of Avoidance as it may appear in intergroup dialogues.

Another limitation of the current study was that it was intended to examine processes that occur in co-leadership broadly (e.g., in intergroup dialogue co-leadership, group psychotherapy co-leadership, etc.) but, due to the availability of intergroup dialogues, looked only at these processes within intergroup dialogue co-leadership. Future research needs to examine the effects of co-leader mental model similarity and feedback interventions designed to augment team cognition in co-leader teams in other types of group interventions.

Another limitation of the current study is that the only outcome included was group climate. This outcome was chosen because previous research has shown that group climate, as measured by the GCQ-S, is related to positive changes in other group member outcomes (e.g., general symptom and life dissatisfaction; Ogrodniczuk & Piper, 2003). However, the relationship between group climate and other group member outcomes has only been examined in psychotherapy groups. Future research needs to examine whether GCQ-S scores in intergroup dialogues are related to other desirable group member outcomes (e.g., reduction in prejudice, knowledge about self and other social identity groups). Additional research also needs to look at whether similarity in co-leader mental models or feedback interventions relate to these other outcomes. Similarly, as stated

above, it may be that feedback interventions for co-leaders are differentially useful in groups that are "off track," as has been shown to be the case in feedback interventions for individual therapists (Lambert et al., 2001). The examination of other outcome variables over time in future research would help to determine whether this is true for feedback interventions for co-leaders of groups. The examination of other outcome variables would also help to illuminate the extent to which the observed, statistically significant changes in Engagement and Avoidance are clinically significant.

Another limitation is that it is not clear the extent to which co-leaders understood and used the feedback provided to them. All co-leaders were asked about the amount of time that they communicated with one another about their group, and it was clear that co-leaders were communicating about their groups between sessions. However, co-leaders in the treatment condition were not asked about how well they understood the Pathfinder output or how they discussed it with their co-leaders. Future research should examine the extent to which co-leaders understand and can make sense of the feedback should be conducted to determine whether it is that the feedback was just not helpful, or whether the feedback was not understood or well-used that accounted for the lack of an effect of this intervention on group climate. Future research may also examine more specifically what co-leaders discuss more broadly when they work together to prepare for and debrief after co-leading their dialogues.

Finally, another limitation is that it is not clear on what basis co-leaders made their similarity ratings of their group members. This was purposely not asked of co-leaders in order to not interfere with their own cognitive processes and to gain an unbiased picture of how they were conceptualizing their group members. However, it

may be that mental model similarity on certain, specific dimensions is related to group climate or group member outcomes, while similarity on other dimensions is not. Future research should examine the specific dimensions on which co-leaders conceptualize their group, and how these dimensions change over time.

Implications

Even given its limitations, the current study has many implications for future research. Similarity in co-leader mental models did not significantly change over time in the current study. This may be because the time that co-leaders worked together was relatively short (i.e., seven weeks). Future research might examine whether co-leader mental model similarity increases when co-leaders spend a greater amount of time working together. For example, future research might examine the similarity in co-leader mental models for teams that lead dialogues together over multiple semesters. Alternatively, research might examine the effects of extending the dialogues themselves (e.g., from half a semester to a full semester) on co-leader mental model similarity.

Examining intergroup dialogues over a full semester would also allow for an examination of the group climate development in intergroup dialogues over a longer time frame to see whether engagement would continue to increase, avoiding would continue to decrease, and whether any significant changes might come about with regard to conflict. Additionally, while it is hypothesized that the desirable group climate for a productive group climate is one that is high in Engagement, lower in Avoidance, and with some level of Conflict across time, other individual and group member outcomes in intergroup dialogues should be examined to confirm this hypothesis. Research including other

outcome variables would also allow for an examination of other ways in which co-leader mental model similarity might affect group interventions.

Given that there was no perceivable effect of the feedback intervention on the group climate in the current study, future research might examine the extent to which co-leaders are able to understand and interpret the feedback that is provided to them. Additionally, future research should examine how co-leaders make use of the feedback with which they are provided. For example, how are they interpreting the feedback, and how are they discussing it with one another? To this end, future research might examine the content of the conversations that group co-leaders have with one another about their groups, and how feedback might change the content of these conversations relevant to co-leaders who do not receive this feedback. Future research might also examine the effects of different types of feedback interventions on co-leader mental models similarity, for example providing co-leaders with feedback about individual group members versus the group as a whole.

The current study examined only the relationship between co-leader mental model similarity and the group climate, as perceived by the group members. Additional group process and outcome variables should also be examined in future research to determine whether co-leader mental model similarity impacts other group processes and/or outcomes. This would also allow for an examination of the effects of co-leader mental model similarity and of feedback interventions in groups that are "off track" with regard to desirable processes or outcomes, versus those that are "on track."

Finally, in the current study, co-leaders were purposely not asked about the dimensions upon which they made their similarity ratings. Future research might examine

these dimensions upon which co-leaders' mental models are built, as it may be that

similarity in co-leader mental models regarding certain dimensions is more important

than others. Future research may also examine whether there is a certain minimum

threshold level of similarity that needs to be reached in co-leader mental models before

this similarity can have an impact on co-leader team performance and group outcomes.

Additionally, future research might examine co-leader mental model accuracy, in

addition to co-leader mental model similarity. That is, are co-leaders' mental models

correct when there is some objective standard upon which they may be measured?

Conclusion

These findings add to the literatures on team cognition in group intervention co-

leader teams and on feedback interventions for co-leaders of group interventions. The

current study failed to replicate the results of the Miles and Kivlighan (2008) study that

found that similarity in co-leaders' mental models of their groups is related to a more

engaging and less avoiding group climate in intergroup dialogues over time. The lack of a

relationship between co-leader mental model similarity and team performance (as

measured in observable group climate ratings) is also inconsistent with the research in

team cognition that has found similarity in team member mental modes is positively

related to team performance (e.g., Bonito, 2004; Espevik et al., 2006; Mathieu et al.,

2000; Waller et al., 2004). This suggests that team cognition in group intervention co-

leader teams is more complicated than proposed by Miles and Kivlighan, and further

research is needed.

The findings of the current study are, however, consistent with the research on

feedback interventions aimed at group intervention co-leaders that has shown no impact

of feedback interventions on group climate (Davies et al., 2008) or group member outcomes (Barlow et al., 1982; Davies et al., 2008). This lack of an effect of feedback interventions aimed at group co-leaders is surprising, given that there is much evidence that feedback interventions aimed at individual therapists seeing individual clients positively impacts client outcomes (e.g., Hawkins et al., 2004; Lambert et al., 2001). Feedback interventions in groups appear to be more complicated than those in individual therapy, and more research is needed to determine if and how feedback interventions might be useful in group co-leadership. Feedback interventions may have the potential to improve group processes and outcomes, and this may be especially important in time limited group interventions. Because co-leadership is a common practice, more research on the co-leader relationship and how feedback interventions may influence the ways in which co-leaders work together as a team is warranted.

Table 1

Mean Group-Level Group Climate and Co-Leader Working Relationship Ratings and Standard Deviaitions by Treatment Conditions and Session

	Group Climate Ratings											
	Engagement				Avoidance				Conflict			
	Treatment Condition		Control Condition		Treatment Condition		Control Condition		Treatment Condition		Control Condition	
Session	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
1	4.16	n.d.	4.42	0.59	4.60	n.d.	4.42	0.44	2.60	n.d.	2.48	0.17
2	4.79	0.22	5.58	1.16	3.97	0.23	3.66	0.30	1.96	0.23	1.92	0.47
3	5.69	0.47	5.13	0.18	4.05	0.36	3.92	0.12	2.17	0.12	2.47	0.75
4	5.48	0.60	5.56	n.d.	4.04	1.12	4.00	n.d.	2.50	0.44	2.45	n.d.
5	5.01	0.15	n.d.	n.d.	3.54	0.65	n.d.	n.d.	2.01	0.33	n.d.	n.d.
6	5.36	0.25	n.d.	n.d.	3.40	0.62	n.d.	n.d.	2.15	0.58	n.d.	n.d.
7	5.58	0.67	4.95	0.21	3.92	0.47	3.95	0.16	2.06	0.80	1.74	0.19
Overall	5.22	0.52	5.08	0.65	3.84	0.56	0.16	0.34	2.15	0.40	2.18	0.47
	Co-Leader Working Relationship Ratings											
	Similar Conceptualization				Common Goals				Worked Well Together			
	Treatment Condition		Control Condition		Treatment Condition		Control Condition		Treatment Condition		Control Condition	
Session	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
1	5.20	n.d.	5.48	0.11	6.00	n.d.	6.38	0.25	5.40	n.d.	6.11	0.16
2	5.62	0.17	6.17	0.24	6.15	0.19	6.50	0.71	5.81	0.45	6.63	0.05
3	5.79	0.20	5.50	0.71	6.31	0.30	5.63	0.88	6.13	0.12	6.13	0.18
4	5.75	0.35	6.20	n.d.	5.88	0.88	6.80	n.d.	5.75	0.71	7.00	n.d.
5	4.72	1.02	n.d.	n.d.	5.89	0.16	n.d.	n.d.	5.44	0.63	n.d.	n.d.
6	5.61	0.40	n.d.	n.d.	5.93	0.65	n.d.	n.d.	5.84	0.57	n.d.	n.d.
7	5.75	0.35	5.00	0.00	5.88	1.80	5.85	0.50	5.63	0.18	5.70	0.99
Overall	5.55	0.47	5.61	0.54	6.03	0.41	6.17	0.62	5.78	0.44	6.24	0.57

Note. n.d. = no data available.

Table 2				
Mean Co-Leader Team Mental Model Similarity Indices and Standard Deviations by Session				
	Treatment Condition		Control Condition	
Session	*M*	*SD*	*M*	*SD*
1	0.43	n.d.	0.3	0.01
2	0.32	0.08	0.34	0.06
3	0.27	0.04	0.26	0.77
4	0.27	0.07	0.23	n.d.
5	0.26	0.03	n.d.	n.d
6	0.39	0.10	n.d.	n.d
7	0.33	0.01	0.35	0.1
Overall	0.32	0.08	0.3	0.7
Note. n.d. = no data available.				

Table 3

Means and Standard Deviations of Quality and Quantity of Communicated Items for Co-Leader Teams by Treatment Condition and Session

| | Amount of Time (in minutes) | | | | Communicated Effectively | | | | Sufficient Time | | | | Co-Leader Aware | | | | Aware of My Co-Leader | | | |
| | Treatment Condition | | Control Condition | | Treatment Condition | | Control Condition | | Treatment Condition | | Control Condition | | Treatment Condition | | Control Condition | | Treatment Condition | | Control Condition | |
Session	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
1	35.00	n.d.	47.50	3.53	5.00	n.d.	6.25	0.35	3.00	n.d.	5.75	1.06	3.00	n.d.	2.75	1.77	3.00	n.d.	2.75	1.77
2	69.34	34.66	40.00	7.07	4.75	1.04	5.00	1.41	4.75	0.96	4.50	1.41	4.25	0.50	4.50	0.00	4.50	0.71	4.50	0.00
3	32.50	17.50	25.00	14.14	4.67	1.53	4.25	1.77	3.83	1.61	3.75	1.77	4.33	1.26	4.25	1.06	4.33	1.76	4.00	0.71
4	96.75	117.73	27.50	n.d.	5.00	0.71	5.00	n.d.	4.75	1.06	5.50	n.d.	4.75	0.35	5.00	n.d.	5.00	0.00	5.00	n.d.
5	116.25	68.94	n.d.	n.d.	6.00	0.00	n.d.	n.d.	5.00	0.00	n.d.	n.d.	5.25	0.35	n.d.	n.d.	4.75	0.35	n.d.	n.d.
6	41.88	41.25	n.d.	n.d.	4.50	0.58	n.d.	n.d.	4.63	0.85	n.d.	n.d.	5.25	0.65	n.d.	n.d.	5.13	0.63	n.d.	n.d.
7	36.25	15.50	15.50	2.83	4.25	0.35	4.50	1.41	4.25	0.35	4.50	2.12	4.75	1.06	4.25	1.06	4.50	0.71	4.25	1.06
Overall	59.78	51.22	31.50	13.87	4.81	0.89	5.00	1.22	4.44	0.97	4.72	1.39	4.64	0.85	4.06	1.13	4.61	0.90	4.00	1.09

Note. n.d. = no data available.

154

Table 4						
Gamm Coefficients, Standard Errors, t-Ratios, and Degrees of Freedom for Growth Curve Analyses of Similarity and Group Climate						
			Gamma Coefficient	Standard Error	*t*-Ratio	Degrees of Freedom
Similarity by Session			0.006	0.008	0.745	(6, 6)
Similarity by Treatment Condition			0.014	0.042	0.326	(6, 5)
Group Climate by Session						
	Engagement*		0.118	0.038	3.084	(7, 7)
	Avoidance*		-0.121	0.043	-2.799	(7, 7)
	Conflict		-0.036	0.072	-0.493	(7, 7)
Group Climate by Similarity						
	Engagement		-1.862	2.591	-0.719	(6, 6)
	Avoidance		0.318	1.725	0.185	(6, 6)
	Conflict		2.090	1.502	1.391	(6, 6)
Group Climate by Condition						
	Engagement		-0.149	0.373	-0.400	(6, 6)
	Avoidance		0.033	0.234	0.141	(6, 6)
	Conflict		-0.452	0.154	-0.084	(6, 6)
Group Climate in Next Session by Similarity						
	Engagement		-2.986	2.146	-1.391	(6, 6)
	Avoidance		0.140	1.364	0.103	(6, 6)
	Conflict		0.137	1.320	0.104	(6, 6)
*p < .05.						

Table 5						
Gamm Coefficients, Standard Errors, t-Ratios, and Degrees of Freedom for Growth Curve Analyses of Co-Leader Ratings of Quality and Quantity of Communication						
			Gamma Coefficient	Standard Error	*t*-Ratio	Degrees of Freedom
Quality/Quantity of Communication by Session						
	Amount of Time		-4.017	3.145	-1.277	(6, 6)
	Communicated Effectively		-0.114	0.094	-1.222	(6, 6)
	Sufficient Time		0.009	0.105	0.085	(6, 6)
	Co-Leader Aware*		0.243	0.071	3.415	(6, 6)
	Aware of Co-Leader*		0.191	0.073	2.586	(6, 6)
Quality/Quantity of Communication by Condition						
	Amount of Time		27.194	26.358	1.032	(5, 5)
	Communicated Effectively		-0.072	0.548	-0.131	(5, 5)
	Sufficient Time		-0.153	0.591	-0.259	(5, 5)
	Co-Leader Aware		0.942	0.556	1.696	(5, 5)
	Aware of Co-Leader		0.956	0.599	1.596	(5, 5)
*p < .05.						

Table 6						
Gamm Coefficients, Standard Errors, t-Ratios, and Degrees of Freedom for Growth Curve Analyses of Group Member Ratings of Co-Leader Working Relationship						
			Gamma Coefficient	Standard Error	t-Ratio	Degrees of Freedom
Co-Leader Working Relationship by Session						
	Shared Conceptualization		0.003	0.039	0.074	(7, 7)
	Common Goals		-0.006	0.036	-0.173	(7, 7)
	Worked Well		-0.013	0.041	-0.314	(7, 7)
Co-Leader Working Relationship by Session						
	Shared Conceptualization		-0.103	0.225	-0.458	(6, 6)
	Common Goals		-0.021	0.306	-0.069	(6, 6)
	Worked Well		-0.202	0.275	-0.734	(6, 6)

Appendix A
Demographic Questionnaire

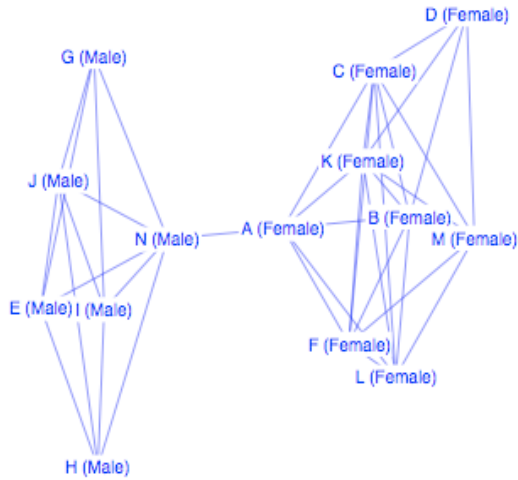|	
Age:	____
Gender:	____Female ____Male ____Transgender (F to M)
Race/Ethnicity:	____African American/Black ____Asian American ____Caucasian/White
Current year in school:	____Freshman ____Sophomore
Highest degree held:	____High School Diploma ____Bachelor's Degree ____Master's Degree
Occupation (if not "student"):	_____
Sexual orientation:	____Straight/Heterosexual ____Gay/Homosexual ____Bisexual

Appendix B
Group Climate Questionnaire – Short Form (GCQ-S; MacKenzie, 1983) and
Co-Leader Working Relationship Questions

Read each item and then mark the appropriate answer to the right of the item. Indicate the extent to which each statement reflects your experience of your most recent dialogue session, 1 = *not at all* and 7 = *extremely*.

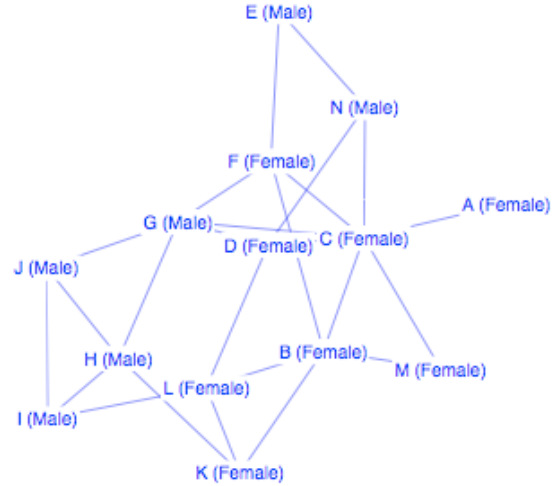| Item	Not at all						Extremely
1. The members liked and cared about each other.	1	2	3	4	5	6	7
2. The members tried to understand why they do the things they do, tried to reason it out.	1	2	3	4	5	6	7
3. The members avoided looking at important issues going on between themselves.	1	2	3	4	5	6	7
4. The members felt that what was happening was important and there was a sense of participation.	1	2	3	4	5	6	7
5. The members depended on the group leaders for direction.	1	2	3	4	5	6	7
6. There was friction and anger between the members.	1	2	3	4	5	6	7
7. The members were distant and withdrawn from each other.	1	2	3	4	5	6	7
8. The members challenged and confronted each other in their efforts to sort things out.	1	2	3	4	5	6	7
9. The members appeared to do things the way they thought would be acceptable to the group.	1	2	3	4	5	6	7
10. The members distrusted and rejected each other.	1	2	3	4	5	6	7
11. The members revealed sensitive personal information or feelings.	1	2	3	4	5	6	7
12. The members appeared tense and anxious.	1	2	3	4	5	6	7
13. To what extent do you feel that your co-facilitators shared a similar conceptualization of your dialogue group and its members in your most recent dialogue session (over the course of the entire semester)?	1	2	3	4	5	6	7
14. To what extent do you feel that your co-facilitators appear to be working toward common goals with your dialogue group in your most recent dialogue session (over the course of the entire semester)?	1	2	3	4	5	6	7
15. To what extent do you feel that your co-facilitators worked well together to co-lead your dialogue group in your most recent dialogue session (over the course of the entire semester)?	1	2	3	4	5	6	7

Read each pair of names, and based on your experience leading your intergroup dialogue, please rate the similarity of each group member pair; 1 = *not at all similar* and 7 = *extremely similar*. Please note, a definition of "similarity" is purposely not given.

	Not at all						Extremely
Group Member A and Group Member B	1	2	3	4	5	6	7
Group Member A and Group Member C	1	2	3	4	5	6	7
Group Member A and Group Member D	1	2	3	4	5	6	7
Group Member A and Group Member E	1	2	3	4	5	6	7
Group Member A and Group Member F	1	2	3	4	5	6	7
Group Member B and Group Member C	1	2	3	4	5	6	7
Group Member B and Group Member D	1	2	3	4	5	6	7
Group Member B and Group Member E	1	2	3	4	5	6	7
Group Member B and Group Member F	1	2	3	4	5	6	7
Group Member C and Group Member D	1	2	3	4	5	6	7
Group Member C and Group Member E	1	2	3	4	5	6	7
Group Member C and Group Member F	1	2	3	4	5	6	7
Group Member D and Group Member E	1	2	3	4	5	6	7
Group Member D and Group Member F	1	2	3	4	5	6	7
Group Member E and Group Member F	1	2	3	4	5	6	7

Appendix D
Sample Pathfinder Network Analysis Output

Co-Leader 1   Co-Leader 2

Note: The above figures represent the Pathfinder Network Analysis output (i.e., the graphical representations of their mental models of their group members) for two co-leaders of the same group, after Session 1. In each mental model, the capital letters represent individual group members. (In the feedback provided to co-leaders in the treatment condition, the group members' first names appeared in the place of these letters. Names were removed from this example for purposes of confidentiality). A line connects group members that were rated as more similar by each co-leader. In the example, it is clear that Co-Leader 1 was conceptualizing her or his group members based on gender, while Co-Leader 2 used some other criteria that was not readily evident. The similarity index for this example is .30.

Appendix E
Quantity and Quality of Co-Leader Communication

1. How many minutes did you and your co-facilitator discuss your group face-to-face in the week preceding your most recently completed session?

2. How many minutes did you and your co-facilitator discuss your group over email in the week preceding your most recently completed session?

3. How many minutes did you and your co-facilitator discuss your group via telephone in the week preceding your most recently completed session?

Read each item below and then mark the appropriate answer to the right of the item. Indicate the extent to which each statement reflects your experience with your co-leader, ranging from 1 = *not at all* and 7 = *extremely*.

	Not at all						Extremely
1. My co-facilitator and I communicated effectively regarding our group during the week preceding our most recently completed session.	1	2	3	4	5	6	7
2. My co-facilitator and I spent sufficient time discussing our group in the week preceding our most recently completed session.	1	2	3	4	5	6	7
3. My co-leader is aware of my conceptualization of our group and its members.	1	2	3	4	5	6	7
4. I am aware of my co-facilitator's conceptualization of our group and its members.	1	2	3	4	5	6	7

Appendix F
Explanation of Pathfinder Network Analysis Output and Discussion Questions for
Co-Leaders in Treatment Condition

Attached to this email, you will find two .pdf files. One represents a graphical representation of your conceptualization of your group members, based on the survey you recently completed. The other is your co-facilitator's graphical representation of her/his conceptualization based on her/his responses to the same survey.

You will see that the students in your dialogue appear as "nodes" in this network. The pairs of students who you (or your co-facilitator) indicated were more similar are connected by lines (i.e., "links"). The pairs of students that you characterized as less similar are not connected by lines.

These graphic representations are one way to understand how you, and your group member are currently thinking about your group members. Obviously, there is no right or wrong way to conceptualize the group members, and every person may conceptualize group members differently.

Below are some questions for you to consider with your co-facilitator as you examine your "network" and discuss your group. (You do not need to record answers to these questions, they are intended to provide some structure for you and your co-facilitator to discuss your representations together.)

How many links do you and your co-leader have in your networks?

How many links do you and your co-leader have in common?

Which links do you have in common with your co-leader?

How do you think those students connected by a link are similar? (Each co-leader should give her or his response to this question. A separate response should be included for each link.).

Which links do you and your co-leader *not* have in common? (i.e., which links do you have that your co-leader does not have, and vice versa?).

For each link that you have that your co-leader does not, explain to your co-leader how you see these two students as similar. (Please answer separately for each link). Similarly, the co-leader who does not have these students linked can explain why she or he sees these students as different.
Which links do you and your co-leader *not* have in common? (i.e., which links do you have that your co-leader does not have, and vice versa?).

How do you (or your co-leader) think that the students connected by these links are similar? (Please answer separately for each link).

References

Allport, G. W. (1954). *The nature of prejudice*. Reading, MA: Addison Wesley.

Alpher, V. S., & Kobos, J. C. (1988). Cotherapy in psychodynamic group psychotherapy: An approach to training. *Group, 12*, 135-144.

Bailis, S. S., & Adler, G. (1974). Co-therapy issues in a collaborative setting. *American Journal of Psychotherapy, 28*, 599-606.

Barlow, S., Hansen, W. D., Fuhriman, A. J., & Finley, R. (1982). Leader communication style: Effects on members of small groups. *Small Group Behavior, 13*, 518-531.

Bernard, H. S., Drob, S. L., & Lifshutz, H. (1987). Compatibility between cotherapists: An empirical report. *Psychotherapy, 24*, 96-104.

Block, S. (1961). Multi-leadership as a teaching and therapeutic tool in group practice. *Comprehensive Psychiatry, 2*, 211-218.

Bonito, J. A. (2004). Shared cognition and participation in small groups: Similarity of member prototypes. *Communication Research, 31*, 704-730.

Bowers, W. A., & Gauron, E. F. (1981). Potential hazards of the co-therapy relationship. *Psychotherapy: Theory, Research, and Practice, 18*, 225-28.

Bridbord, K. H. (2003). Group co-leadership: The effects of personality, temperament, compatibility, and leadership style on relationship satisfaction. Unpublished doctoral dissertation: University of Buffalo, State University of New York.

Cannon-Bowers, J. A., & Salas, E. (2001). Reflections on shared cognition. *Journal of Organizational Behavior, 22*, 195-202.

Cooke, N. J. (2005). Augmented team cognition. In D. D. Schmorrow (Ed.), *Foundations*

of augmented cognition (pp. 1211-1218). Mahwah. NJ: Lawrence Erlbaum Associates.

Cooke, N. J., Gorman, J. C., Duran, J. L., & Taylor, A. R. (2007). Team cognition in experienced command-and-control teams. *Journal of Experimental Psychology: Applied, 13*, 146-157.

Cooke, N. J., Gorman, J. C., & Winner, J. L. (2007). Team cognition. In F. T. Durso, R. S. Nickerson, S. T. Dumais, S. Lewandowsky, & T. J. Perfect (Eds.), *Handbook of applied cognition* (2nd ed.) pp. 239-268. West Sussex, England: John Wiley & Sons.

Davies, D. R., Burlingame, G. M., Johnson, J. E., Gleave, R. L., & Barlow, S. H. (2008). The effects of a feedback intervention on group process and outcome. *Group Dynamics: Theory, Research, and Practice, 12*, 141-154.

Davis, F. B., & Lohr, N. E. (1971). Special problems with the use of cotherapists in group psychotherapy. *International Journal of Group Psychotherapy, 21*, 143-158.

Dick, B., Lessler, K., & Whiteside, J. (1981). A developmental framework for cotherapy. *International Journal of Group Psychotherapy, 30*, 273-285.

Diedrich, F. J., Freeman, J., Entin, E. E., Weil, S. A., & MacMillan, J. (2005). Modeling, measuring, and improving cognition at the team level. In D. D. Schmorrow (Ed.), *Foundations of augmented cognition* (pp. 1219-1227). Mahwah. NJ: Lawrence Erlbaum Associates.

Dies, R. R. (1974). Attitudes toward the training of group psychotherapists: Some interprofessional and experience-associated differences. *Small Group Research, 5*, 65-79.

Dies, R. R. (1980). Current practice in the training of group psychotherapists. *International Journal of Group Psychotherapy, 30*, 169-185.

Dies, R. R., & Dies, K. R. (1993). The role of evaluation in clinical practice: Overview and group treatment illustration. *International Journal of Group Psychotherapy, 43*, 77-105.

Dies, R. R., Mallet, J., & Johnson, F. (1979). Openness in the coleader relationship: Its effect on group process and outcome. *Small Group Behavior, 10*, 523-546.

Dreikurs, R. (1950). Techniques and dynamics of multiple psychotherapy. *Psychiatric Quarterly, 24*, 788-799.

Dugo, J. M., & Beck, A. P. (1991). Phases of co-therapy team development. In B. Roller, & V. Nelson (Eds.), *The art of co-therapy: How therapists work together* (pp. 155-188). New York: The Guilford Press.

Edwards, B., D., Day, E. A., Arthur, W., & Bell, S. T. (2006). Relationships among team ability composition, team mental models, and team performance. *Journal of Applied Psychology, 91*, 727-736.

Espevik, R., Johnsen, B. H., Eid, J., & Thayer, J. F. (2006). Shared mental models and operational effectiveness: Effects of performance and team process in submarine attack teams. *Military Psychology, 18*, S23-S36.

Fall, K. A., & Menendez, M. (2002). Seventy years of co-leadership: Where do we go from here? *Texas Counseling Association Journal, 30*, 24-33.

Fall, K. A., & Wejnert, T. J. (2005). Co-leader stages of development: An application of Tuckman and Jensen (1977). *The Journal for Specialists in Group Work, 30*, 309-327.

Friedman, B. (1973). Cotherapy: A behavioral and attitudinal survey of third-year

psychiatric residents. *International Journal of Group Psychotherapy, 23*, 228-234.

Habib, K. (1996). *Compatibility in the supervisory group co-therapy relationship*.

Unpublished doctoral dissertation, The University of Texas at Austin.

Hadden, S. B. (1947). The utilization of a therapy group in teaching psychotherapy. *The*

American Journal of Psychiatry, 103, 644-648.

Hawkins, E. J., Lambert, M. J., Vermeersch, D. A., Slade, K. L., & Tuttle, K. C. (2004).

The therapeutic effects of providing patient progress information to therapists and

patients. *Psychotherapy Research, 14*, 308-327.

Heilfron, M. (1969). Co-therapy: The relationship between therapists. *International*

Journal of Group Psychotherapy, 19, 366-381.

Hellwig, K., & Memmott, R. J. (1974). Co-therapy: The balancing act. *Small Group*

Behavior, 5, 175-181.

Hendrix, C. C., Fournier, D. G., & Briggs, K. (2001). Impact of co-therapy teams on

client outcomes and therapist training in marriage and family therapy.

Contemporary Family Therapy, 23, 63-82.

Henning, R. A., Smith, T. J., & Korbelak, K. T. (2005). Social psychophysiological

compliance as a gauge of teamwork. In D. D. Schmorrow (Ed.), *Foundations of*

augmented cognition (pp. 1228-1238). Mahwah. NJ: Lawrence Erlbaum

Associates.

Hinsz, V. B. (1995). Mental models of groups as social systems: Considerations of

specification and assessment. *Small group research, 26*, 200-233.

Hinsz, V. B. (2004). Metacognition and mental models in groups: An illustration with

metamemory of group recognition memory. In E. Salas, & S. M. Fiore (Eds.), *Team cognition: Understanding the factors that drive process and performance* (pp. 33-58).

Kiekel, P. A. (2005). FAUCET: Using communication flow analysis to diagnose team cognition. In D. D. Schmorrow (Ed.), *Foundations of augmented cognition* (pp. 1249-1256). Mahwah. NJ: Lawrence Erlbaum Associates.

Kivlighan, D. M. (1985). Feedback in group psychotherapy: Review and implications. *Small Group Behavior, 16*, 373-385.

Kivlighan, D. M., & Goldfine, D. C. (1991). Endorsement of therapeutic factors as a function of stage of group development and participant interpersonal attitudes. *Journal of Counseling Psychology, 38*, 150-158.

Kivlighan, D. M., Jr., & Lilly, R. L. (1997). Developmental changes in group climate as they relate to therapeutic gain. *Group Dynamics: Theory, Research, and Practice, 1*, 208-211.

Kivlighan, D. M., Markin, R. D., Stahl, J. V., & Salahuddin, N. M. (2007). Changes in the ways that group trainees structure their knowledge of group members with training. *Group Dynamics: Theory, Research, and Practice, 11*, 176-186.

Kivlighan, D., M., Jr., & Tarrant, J. M. (2001). Does group climate mediate the group leadership-group member outcome relationship? A test of Yalom's hypotheses about leadership priorities. *Group Dynamics: Theory, Research, and Practice, 5*, 220-234.

Klimoski, R., & Mohammed, S. (1994). Team mental model: Construct or metaphor? *Journal of Management, 20*, 403-437.

Kosch, S. G., & Reiner, C. A. (1983). Multiple versus individual therapy: Are two better

    than one? *American Journal of Psychotherapy, 37*, 567-581.

Lambert, M. J., Whipple, J. L., Smart, D. W., Vermeersch, D. A., Nielsen, S. L., &

    Hawkins, E. J. (2001). The effects of providing therapists with feedback on

    patient progress during psychotherapy: Are outcomes enhanced? *Psychotherapy*

    Research, 11, 49-68.

Lantz, J. E. (1978). Cotherapy approach in family therapy. *Social Work, 23*, 156-158.

Levesque, L. L., Wilson, J. M., & Wholey, D. R. (2001). Cognitive divergence and

    shared mental models in software development project teams. *Journal of*

    Organizational Behavior, 22, 135-144.

Lim, B. C., & Klein, K. J. (2006). Team mental models and team performance: A field

    study of the effects of team mental model similarity and accuracy. *Journal of*

    Organizational Behavior, 27, 403-418.

LoPiccolo, J., Heiman, J. R., Hogan, D. R., & Roberts, C. W. (1985). Effectiveness of

    single therapists versus cotherapy teams in sex therapy. *Journal of Consulting and*

    Clinical Psychology, 53, 287-294.

Luke, M., & Hackney, H. (2007). Group coleadership: A critical review. *Counselor*

    Education and Supervision, 46, 280-293.

Lundin, W. H., & Aronov, B. M. (1952). The use of co-therapists in group

    psychotherapy. *Journal of Consulting Psychology, 16*, 76-80.

MacKenzie, K. R. (1981). Measurement of group climate. *International Journal of Group*

    Psychotherapy, 29, 287-296.

MacKenzie, K. R. (1983). The clinical application of a group climate measure. In R. R.

Dies, & K. R. MacKenzie (Eds.), *Advances in group psychotherapy: Integrating research and practice* (pp. 159-170). New York: International Universities Press.

Maclennan, B. W. (1965). Cotherapy. *International Journal of Group Psychotherapy, 15*, 154-166.

Mathieu, J. E., Heffner, T. S., Goodwin, G. F., Salas, E., & Cannon-Bowers, J. A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology, 85*, 273-283.

McGee, T. F., & Schuman, B. N. (1970). The nature of the co-therapy relationship. *International Journal of Group Psychotherapy, 20*, 25-36.

McMahon, N., & Links, P. S. (1984). Cotherapy: The need for positive pairing. *Canadian Journal of Psychiatry, 29*, 385-389.

Mehlman, S. K., Baucom, D. H., & Anderson, D. (1983). Effectiveness of cotherapists versus single therapists and immediate versus delayed treatment in behavioral marital therapy. *Journal of Consulting and Clinical Psychology, 51*, 258-266.

Miles, J. R., & Kivlighan, D. M. (2008). Team cognition in group interventions: The relation between co-leaders' shared mental models and group climate. *Group Dynamics: Theory, Research, and Practice*.

Miles, J. R., & Kivlighan, D. M. (in press). Co-leader similarity and group climate in group interventions: Testing the co-Leadership, team cognition-team diversity model. *Group Dynamics: Research, Theory, and Practice.*

Mintz, E. E. (1963). Transference in co-therapy groups. *Journal of Consulting Psychology, 27*, 34-39.

Mohammed, S., Klimoski, R., & Rentsch, J. R. (2000). The measurement of team mental models: We have no shared schema. *Organizational Research Methods, 3*, 123 165.

Nagda, B. A. (2006). Breaking barriers, crossing borders, building bridges: Communication processes in intergroup dialogues. *Journal of Social Issues, 62*, 553-576.

Ogrodniczuk, J. S., & Piper, W. E. (2003) The effect of group climate on outcome in two forms of short-term group therapy. *Group Dynamics: Theory, Research, and Practice, 7*, 64-76.

Okech, J. E. A., & Kline, W. B. (2006). Competency concerns in group co-leader relationships. *The Journal for Specialists in Group Work, 31*, 165-180.

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology, 90*, 751-783.

Piper, W. E., Doan, B. D., Edwards, E. M., & Jones, B. D. (1979). Cotherapy behavior, group therapy process, and treatment outcome. *Journal of consulting and clinical psychology, 47*, 1081-1089.

Rabin, H. M. (1967). How does co-therapy compare with regular group therapy? *American Journal of Psychotherapy, 21*, 244-255.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Thousand Oaks, CA: Sage.

Rentsch, J. R., & Hall, R. J. (1994). Members of great teams think alike: A model of team effectiveness and schema similarity among team members. *Advances in Interdisciplinary Studies of Work Teams, 1*, 223-261.

Rentsch, J. R., & Woehr, D. R. (2004). Quantifying congruence in cognition: Social r

elations modeling and team member schema similarity. In E. Salas & S. M. Fiore

(Eds.), *Team cognition: Understanding the factors that drive process and*

performance (pp. 11-31). Washington, DC: American Psychological Association.

Reynolds, E., & McWhirter, J. J. (1984). Cotherapy from the trainee's standpoint:

Suggestions for supervision. *Counselor Education and Supervision, 23*, 205-213.

Riva, M. T., Wachtel, M., & Lasky, G. B. (2004). Effective leadership in group

counseling and psychotherapy: Research and practice. In J. L. Delucia-Waack,

D.A. Gerrity, & C. R. Kalodner (Eds.), *Handbook of group counseling and*

psychotherapy (pp. 37-48). Thousand Oaks, CA: Sage.

Roller, B., & Nelson, V. (1991). *The art of co-therapy: How therapists work together*.

New York: The Guilford Press.

Roller, B., & Nelson, V. (1993). Cotherapy. In H. I. Kaplan, & B. J. Sadock (Eds.),

Comprehensive group psychotherapy, 3rd ed. (pp. 304-312). Baltimore, MD:

Williams & Wilkins.

Salas, E., Dickinson, T. L., Converse, S. A., & Tannenbaum, S. I. (1992). Toward an

understanding of team performance and training. In R. W. Swezey & E. Salas

(Eds.), *Teams: Their training and performance* (pp. 3-29). Norwood, NJ: Ablex.

Schvaneveldt, R. W. (1990). *Pathfinder associative networks: Studies in knowledge*

organization. Norwood, NJ: Ablex.

Sidall, L. B., & Bosma, B. J., (1976). Co-therapy as a training process. *Psychotherapy:*

Theory, Research, and Practice, 13, 209-213.

Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling*

change and event occurrence. New York: Oxford University Press.

Stout, R. J., Cannon-Bowers, J. A., Salas, E., & Milanovich, D. M. (1999). Planning, shared mental models, and coordinated performance: An empirical link is established. *Human Factors, 41*, 61-71.

Tasca, G.A., Balfour, L., Ritchie, K., & Bissada, H. (2006). Developmental changes in group climate in two types of group therapy for Binge Eating Disorder. A growth curve analysis. *Psychotherapy Research, 16*, 499-514.

Tashiro, T, & Mortensen, L. (2006). Translational research: How social psychology can improve psychotherapy. *American Psychologist, 61*, 959-966.

University of Maryland, Office of Human Relations Programs (n.d.). *Words of Engagement: An intergroup dialogue program*. Retrieved June 17, 2005, from http://www.ohrp.umd.edu/WE/registration.html.

Van Atta, R. E. (1969). Co-therapy as a supervisory process. *Psychotherapy: Therapy, Research and Practice, 6*, 137-139.

Waller, M. J., Gupta, N., & Giambatista, R. C. (2004). Effects of adaptive behaviors and shared mental models on control crew performance. *Management Science, 50*, 1534-1544.

Weinstein, I. P. (1971). Guidelines on the choice of a co-therapist. *Psychotherapy: Theory, Research and Practice, 8*, 301-303.

Wheelan, S. A. (1997). Co-therapists and the creation of a functional psychotherapy group: A group dynamics perspective. *Group Dynamics: Theory, Research, and Practice, 1*, 306-310.

Yalom, I. D., & Leszcz, M. (2005). *The theory and practice of group psychotherapy* (5th

ed.). New York: Basic Books.

Zuniga, X., Nagda, B. A., Chesler, M., & Cytron-Walker, A. (2007). Intergroup dialogue
in higher education: Meaningful learning about social justice. *ASHE Higher
Education Report*, 32, 1-128.

Zuniga, X., Nagda, B. A., & Sevig, T. D. (2002). Intergroup dialogues: An educational
model for cultivating engagement across differences. *Equality and Excellence
in Education, 35*, 7-17.