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Markers of Marijuana Use Outcomes Within Adolescent Substance Abuse Group Treatment

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Abstract

Objectives: Despite their popularity, little is known about what distinguishes effective from ineffective or even iatrogenic adolescent group interventions. **Methods:** Audio recordings and transcripts from 19, 8–10 session, school-based treatment groups comprised of 108, substance abusing 10- to 19-year olds were analyzed. *Group leader empathy* was measured globally, while two new constructs, *group commitment* and *peer response*, were measured using discourse analysis. All variables were measured at the group level. **Results:** Associations among these process variables were tested and supported, as were the hypothesized associations between both group member language constructs and *marijuana use* outcomes. **Conclusions:** These findings were consistent with a proposed theoretical model in which group commitment and peer response predict marijuana use outcomes and mediate the effects of group leader empathy. These observable, in-session, verbal behaviors could distinguish whether adolescents in a group intervention will decrease, maintain, or possibly increase the targeted behavior and are likely influenced by group leader empathy.

Keywords

group work, adolescents, substance abuse, group processes, randomized clinical trial, outcome study

Adolescent substance abuse is a widely recognized social problem associated with a host of other high-risk behaviors and psychiatric disorders. Marijuana is by far the most commonly abused illicit drug. In 2006, Monitoring the Future national survey data indicated that 12%, 24%, and 32% of 8th, 10th, and 12th graders, respectively, reported smoking marijuana in the previous year, which was down from nearly 20%, 35%, and 40% for the same age groups in 1997 (Johnston, O'Malley, Bachman, & Schulenberg, 2007). However, the prevalence of *daily* marijuana use for these age groups, which is more indicative of abuse than much less frequent or experimental use, increased from 0.2%, 0.8%, and 2.0% in 1991 to 1.0%, 3.1%, and 5.0% in 2005 (Johnston, O'Malley, Bachman, & Schulenberg, 2005). Thus, the prevalence of frequent or daily adolescent marijuana use has substantially increased in recent years and constitutes a serious risk behavior.

Group work is the most common modality for treating marijuana and other drug abuse for all ages including adolescents (Flores & Mahon, 1993; Piper & McCallum, 1994). The popularity of group interventions in schools is evidenced by the growing number of group-based student assistance programs (Carlson, Hughes, LaChapelle, Holayter, & Deebach, 1994), which include over 3,000 members of the National Association of Leadership for Student Assistance Programs, 1,500 schools with student assistance programs, and the tens of

thousands of students served by them (Wagner, Kortlander, & Morris, 2001).

The popularity of group work may be attributed to its cost-effectiveness and otherwise efficient use of resources (Kaminer, Burleson, & Goldberger, 2002). Group work can also promote emotional regulatory, social support seeking (Piper & McCallum, 1994), and other interpersonal skills, which are important developmental tasks (Dies, 2000; Manaster, 1977). Group work is also more similar to youths' everyday lives (Kaminer et al., 2002) and may be perceived as less threatening, or intense, than individual counseling (MacLennan & Dies, 1992; Shechtman, 2002). In addition, because substance abuse and other problem behaviors can compromise adolescents' social competencies (Scheier & Newcomb,

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1991), group work that facilitates the development of these skills may bolster related protective factors (Botvin, 2000).

The potential for iatrogenic effects has raised the stakes for adolescent group work researchers. An iatrogenic effect is unintentional compounding of a target or other problem behavior by an intervention. Because such effects have been found to occur within adolescent group work (e.g., Dishion, Poulin, & McCord, 1999), some conclude that group work should be avoided with high-risk adolescent populations (Dodge, Dishion, & Lansford, 2006). Others, however, conclude that adolescent alcohol and other drug (AOD) group interventions are as effective as other treatments or modalities (Kaminer, 2005; Waldron & Kaminer, 2004; Waldron & Turner, 2008; Vaughn & Howard, 2004).

Waldron and Turner (2008) performed a meta-analysis involving 17 studies since 1998, which included 46 different intervention conditions including 13 group cognitive behavior therapy (CBT) replications. The authors reported that three treatment approaches, one of which was group CBT, emerged as well-established models for AOD abuse treatment. None of the treatment approaches appeared to be clearly superior to the others. In a narrative review, Kaminer (2005) documented the substantial evidence for the benefits of group work with adolescents with AOD problems. Waldron and Kaminer (2004) reviewed the evidence for cognitive behavior therapy (CBT) approaches to reducing AOD use. Their narrative review documented consistent empirical evidence that group and (individual) CBT is related to statistically and clinically significant reductions in AOD use. In a meta-analysis of the recent AOD literature, Vaughn and Howard (2004) identified two therapies, multidimensional family therapy and group CBT, as having the highest empirical support (an "A" rating). They noted that these treatments had clinically meaningful effect sizes ($ES > .20$), with at least 1-year follow-up or replication and used relatively strong designs.

Although the above reviews generally concluded that adolescent group interventions along with other interventions are effective, only 13 such group treatments have been evaluated in efficacy studies reporting AOD outcomes. In a review exclusively targeting these treatments, Engle and Macgowan (in press) revealed that most indicated positive outcomes and two met criteria for being possibly efficacious (see Chambless & Hollon, 1998). Thus, adolescent AOD group treatments can effectively reduce use.

The treatment factors or change mechanisms responsible for outcomes, however, are unknown. Engle and Macgowan (in press) noted a prevalent lack of attention to processes, group structures, and leadership variables in constructing and reporting on adolescent AOD group treatments. Ongoing studies are examining mechanisms of change within such groups (Macgowan & Wagner, 2005), but these are few. Thus, the pervasiveness and seriousness of adolescent marijuana abuse combined with the popularity, potential for iatrogenic effects, limited efficacy studies, and lack of attention to processes within adolescent AOD group treatment culminate in a research problem with widespread clinical implications.

In the current study, the authors examined constructs intended to represent observable, in-session processes within group treatments that could eventually distinguish effective from ineffective or even potentially iatrogenic interventions. This exploratory study examined group leader empathy, group commitment, and peer response (to commitment language). Group leader empathy was measured globally. Group commitment and peer response, however, were measured using a discourse analysis approach in which specific group member language was parsed and coded. These group member language constructs are theorized to act as change mechanisms within adolescent group treatment. A theoretical model delineating these factors is also presented.

Conceptual Foundation

Process research examining the change processes or mechanisms, treatment factors, and/or active ingredients responsible for varying treatment outcomes is integral to improving the effectiveness of group work. Change mechanisms are events that lead to and cause therapeutic change and require rather complex research designs to study (Nock, 2007). This exploratory process study stands to identify markers of participant behavior change that could indicate whether a group is having a positive or negative influence on group members. Such markers may further inform therapeutic environments or treatment settings that are conducive to targeted behavior change. A review of the three process constructs examined within an adolescent AOD group intervention is presented next.

Empathy in Group Work

In the group work literature, positive effects of person-centered skills date back 50 years (Ends & Page, 1957), whereas confrontational approaches typically have deleterious effects (Lieberman, Yalom, & Miles, 1973). Group leader empathy has been associated with more positive outcomes as well as with a number of other therapeutic features, supporting the notion that these features coalesce into a generally therapeutic environment (Johnson, Burlingame, Olsen, Davies, & Gleave, 2005; Yalom, 1995). Empathy is associated with such therapeutic group features as cohesion (Roark & Sharah, 1989), alliance (Horvath, 1994), and group climate (Phipps & Zastowny, 1988). Burlingame and colleagues (2006) further identified empathy as a key element in effective group work and included it as one of the recommended elements to measure in the CORE Battery, an assessment toolkit for group work.

Conversely, Lieberman et al. (1973) found that group leader aggression and intrusiveness in demanding self-disclosure, emotional expression, and attitude change contribute to negative outcomes. Smokowski, Rose, Todar, and Reardon (1999) identified several group leader characteristics that are antithetical to empathy and were associated with group member casualties. These characteristics included being perceived to perpetrate stressful events, pressuring group members, giving non-helpful feedback and bad advice, being critical of

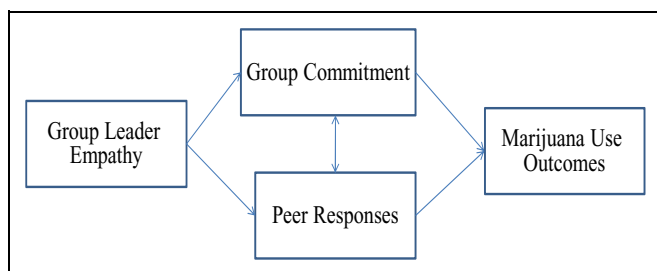


Figure 1. Adolescent Group Process Outcome Model. Group leader empathy predicts stronger (positive) group commitment and peer response, which in turn correlate with one another and predict marijuana use outcomes.

members, monopolizing group time, not fostering a supportive environment, and being perceived as unqualified and incompetent.

Therapist effects on substance use outcomes are well documented (Binder & Strupp, 1997; Hilliard, Henry, & Strupp, 2000; Luborsky, McLellan, Woody, O'Brien, & Auerback, 1985; Pantalon, Chawarshki, Falcioni, Pakes, & Schottenfeld, 2004; Strupp & Anderson, 1997). Therapist empathy has been found to be significantly associated with reductions in cocaine (Barber et al., 2000) and alcohol use for up to 2 years after treatment (Connors, Carroll, DiClemente, Longabaugh, Donovan, 1997; Miller & Baca, 1983).

Empathy is regarded as a cornerstone of motivational interventions (Miller, 2000; Miller & Rollnick, 2002). Moreover, process studies have demonstrated relationships between empathy and therapist use of other empirically supported skills and techniques. Empirically supported interpersonal skills associated with empathy include responding positively to client resistance and fostering therapeutic alliance (Binder & Strupp, 1997; Hilliard et al., 2000; Pantalon et al., 2004; Strupp & Anderson, 1997). Empirically supported behavioral techniques associated with empathy include functional analyses of behavior and skills training (Pantalon et al., 2004).

Furthermore, empathetic therapist styles have predicted lower client resistance, a process associated with poorer outcomes. In a seminal ABAB design process study, Patterson and Forgatch (1985) demonstrated that an empathetic supportive–reflective therapist style decreased client resistance, whereas a directive–confrontational style increased client resistance within the same treatment sessions. Miller, Benefield, and Tonigan (1993) further found in a clinical trial examining a directive and confrontation versus a supportive and empathetic clinical style that therapist confrontation and client resistance were associated with poorer drinking outcomes.

Thus, therapist empathy has long been identified as a part of fostering therapeutic group environments and achieving positive substance use outcomes. It is also associated with increased use of empirically supported interpersonal and behavioral therapist skills and techniques. Finally, it has been found to directly affect in-session client behavior associated with outcomes. Therefore, empathy is a logical process variable to consider when studying change mechanisms.

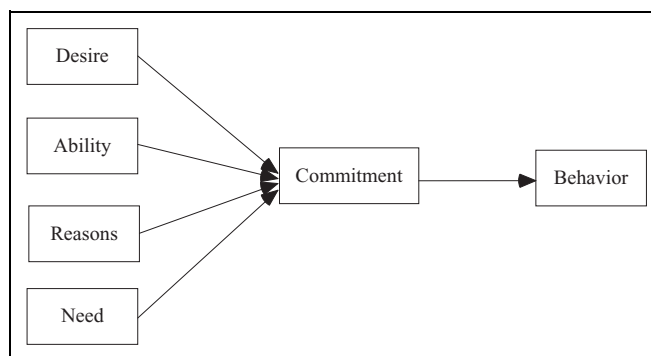


Figure 2. Proposed Commitment-Behavior Change Model: “Client mental constructs are realized as client natural language arising during MI. Client commitment mediates underlying dimensions of Desire, Ability, Need and Reasons becoming their final common pathway in their influence on behavior outcome” (Amrhein, 2004, p. 331).

Adapted with permission from “How Does Motivational Interviewing Work? What Client Talk Reveals,” by P. C. Amrhein, 2004, *Journal of Cognitive Psychotherapy: An International Quarterly*, 18, 4, p. 331.

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Empathy and Group Commitment

As illustrated in the theoretical model in Figure 1, group commitment is theorized to act as one of two mediators between group leader empathy and marijuana use outcomes. Rogers (1961) posited that empathy sets the stage for positive behavior change to occur. Therapist empathy facilitates clients’ self-acceptance, which paradoxically frees them to change (Rogers, 1961). Miller and Rollnick (2002) further specified in the motivational interviewing (MI) therapeutic approach that therapist empathy among other skills promotes change talk, which then leads to behavior change.

Change talk involves clients’ statements about their desire, ability, reasons, and need (DARN) to change, while sustain talk describes similar statements that oppose change. Together change and sustain talk represent distinct aspects of client ambivalence about behavior change (Amrhein, 2004; Miller, Moyers, Amrhein, & Rollnick, 2006). Thus, the accepting and non-threatening nature of genuine therapist empathy encourages clients to openly and honestly evaluate their ambivalence (i.e., the pros and cons) regarding behavior change.

The DARN change talk constructs are further theorized to act as underlying dimensions of commitment language, another form of change talk that plays an especially important role in behavior change (Amrhein, Miller, Yahne, Palmer, & Fulcher, 2003; Miller & Rollnick, 2002). Commitment language is defined as a “proposition or set of propositions that, when uttered, is understood by the speaker and listener(s) to obligate the speaker to perform some action in the future” (Amrhein et al., 2003, p. 863). As clients resolve their ambivalence in favor of change, their DARN change talk and commitment language become increasingly positive (Amrhein, 2004; Miller & Rollnick, 2002). Commitment language is, then, a final common pathway to the targeted behavior (Amrhein, 2004).

Figure 2 represents the relationships among the underlying DARN constructs, commitment language, and behavioral

outcome. The DARN constructs predict commitment language and commitment language predicts outcomes (Amrhein, 2004). Amrhein et al. (2003) proposed and empirically supported this model in a process study involving a single MI session. As hypothesized, clients' underlying DARN constructs correlated with commitment language, which in turn correlated with substance use outcomes.

Unlike individual client commitment, to the best of our knowledge, group commitment has yet to be assessed in a clinical setting. As a group level variable, we expected that commitment language as defined above would also predict outcomes. In the current study, it was tallied at the middle and ending phases of group treatment. In this manner, group commitment utterances across sessions were combined to form respective aggregate commitment scores.

Peer Influence in Groups

The other variable posited to be a marker and potential mediator of the effects of group leader empathy on marijuana use outcomes is peer response (to commitment language). This new construct is particularly relevant to group work with adolescents, given the powerful influence of peers during this developmental period especially regarding substance use (Akers, 1999; Pearson & Michell, 2000; Wright & Cullen, 2004). Peer interactions among adolescents in group settings can produce positive (e.g., Feldman, Caplinger, & Wodarksi, 1983) as well as negative effects (e.g., Dishion et al., 1999).

Social learning theory has been used to explain these peer effects. During adolescence approval, acceptance and reinforcement from peers is paramount. Thus, when peers model and/or reinforce prosocial or deviant behaviors, adolescents are likely to increase those behaviors (Akers, 1999; Dodge, Dishion, Lansford, 2006). Such processes can strongly impact behavioral outcomes of groups in which adolescents are likely to reinforce each others' behaviors at a higher rate than the group leader.

Peer response was developed in recognition of the powerful peer processes in adolescent group work and the mediating role of commitment language. This construct describes peer group member reactions following the expression of commitment language by another group member. As illustrated in Figure 1, peer response is theorized to be another change mechanism that interacts with group commitment and similarly predicts subsequent substance use.

Conceptual Model

The hypotheses of this exploratory process study were grounded in the theoretical model presented in Figure 1. Higher group leader empathy was hypothesized to correlate positively with group commitment and peer response to commitment language. Group commitment and peer response are jointly referred to hereafter as *group member language*. Scores were calculated for middle and ending group sessions, resulting in two variables each: Middle group commitment, ending group commitment, middle peer response, and ending peer response.

These group member language variables were then hypothesized to predict subsequent marijuana use, which was also operationalized at the group level. Group marijuana use scores were calculated for each follow-up assessment period from the parent study.

Hypothesis 1: Group leader empathy will positively correlate with middle and ending group commitment to reduce marijuana use.

Hypothesis 2: Group leader empathy will positively correlate with middle and ending peer response.

Hypothesis 3: Middle and ending group commitment scores will correlate with group marijuana use scores at follow-up assessments up to 12 months.

Hypothesis 4: Middle and ending peer response to commitment language will correlate with group marijuana use scores at follow-up assessments up to 12 months.

Methods

Parent Study

The Teen Intervention Project (TIP) was motivated by social learning and problem behavior theories and was a manualized and standardized version of the Westchester Model Student Assistance Programs "abusers groups" (Wagner et al., 2001). This study involved new data collection originating from a randomized clinical trial funded by the National Institute of Alcohol Abuse and Alcoholism (NIAAA) (R01 AA10246; PI: Wagner) that initially included 122 13- to 17-year olds in the experimental group assigned to received school-based group treatment for substance use problems (Wagner et al. 2001). Sufficient data for the present process study was available on 108 participants. Participant marijuana and other substance use was assessed at pretest, posttest, and 1, 4, and 12 months following treatment (Wagner et al., 2001).

Participants

A pre-intervention assessment using the Composite International Diagnostic Interview criteria determined whether adolescents referred by parents and school officials were appropriate for TIP. Those who were not involved with substances or who were in need of more intensive substance abuse or psychiatric treatment were excluded. Adolescents, who used substances to cope with negative moods, engage in comfortable social interactions, or to manage social pressures, were retained for the study (Wagner et al., 2001). These adolescents were considered to be at risk of developing AOD use problems. TIP was a school-based intervention intended to reach the greatest number of students before their use resulted in more serious consequences. Student assistance programs are the most popular school-based intervention for adolescents with AOD problems (Wagner et al., 2001).

This study's participant demographics included 55% males; 72% non-Hispanic White; 15% Hispanic; 9% African

American; and 4%, "other"; and 13% 7th; 44% 8th; 15% 9th; 14% 10th; 7% 11th; and 7% 12th graders. Ages ranged from 10 to 19 years old, with a mean age of 15 years old.

Marijuana was the most common drug of choice (DOC), with 40% of participants identifying it as such and another 11% identifying both marijuana and alcohol as their DOC. Twenty-five percent identified alcohol only as their DOC, 11% identified any other drug, and 13% did not answer or specify. The average participant used marijuana 3–9 times per month, *SD* of 1.5, and alcohol 1–2 times per month at pretest, *SD* of 1.2. Thus, marijuana was the most popular DOC and the most frequently used.

Marijuana use was measured with the Drug Use Screening Inventory–Revised (DUSI-R). This measure has been shown to be highly reliable and valid for adolescent substance use problems in a number of studies (e.g., Kiriscki, Mezzich, & Tarter, 1995; Tarter & Hegeus, 1991; Tarter, Laird, Bukstein, & Kaminer, 1992; Tarter, Mezzich, Castillo, Kirisci, & Kaczynski, 1994). The DUSI-R utilizes a 5-point scale to indicate the number of times a substance was used in the past 30 days. A "1" indicates *no use*, "2," *1–2 times*, "3," *3–9*, "4," *10–20*, and "5" indicates *over 20 times*.

Group Structure

The mean number of sessions attended was 6.3 (*SD* = 2.4). Group composition with regard to gender, race, and ethnicity varied considerably across groups and over group sessions as attendance changed. Participant ages were within 3 years of one another, since the groups were school-based.

Group Leaders

Consistent with the Westchester Model student assistance programs, each group was led by a master's-level clinician, two of whom earned doctoral degrees by the end of the study. Five different therapists in all led the sessions. Three of the leaders were male, and all had experience conducting adolescent groups. Two groups were led by co-facilitators. All group sessions were audiotaped in order to monitor adherence to the treatment manual.

Present Study

Data collection. The client language and group leader process data for this study were derived from audio recordings and transcripts of the TIP group sessions prepared by a National Institute on Alcohol Abuse and Alcoholism exploratory/developmental study examining group process among TIP participants (1R21AA015679–01; PI: Macgowan; Macgowan & Wagner, 2005) and IRB approval was obtained. Additional data were collected and coded with the support of a National Institute of Health Ruth L. Kirschstein National Research Service Award for doctoral-level training (F31 DA 020233–01A1; PI: Engle). The audio channel has been used extensively in group process and outcome research (e.g., Getter, Litt, Kadden, & Cooney, 1992; Kangas, 1971) and generally has been supported as a valid source of data for ratings (DeRubeis,

Hollon, Evans, & Bemis, 1982). Advantages of coding data from transcripts in addition to audio recordings include less required skill (Stiles, 1987), facilitation in identifying speakers in groups (Beck, Dugo, Eng, & Lewis, 1986), and the use of rapid text searches for the occurrence of specified language.

MI Treatment Integrity

Ratings of group leader MI skills, including empathy, were derived from a single, randomly selected, 20-min group treatment session segment, using the MI Treatment Integrity (MITI) Version 2.0 (Moyers, Martin, Manuel, & Miller, 2004). The MITI rates empathy and MI spirit globally from 1 to 7 and also includes several behavioral count measures that are operationalized as ratios. These ratios include open to closed questions, reflections to questions, simple to complex reflections, and MI adherent to MI nonadherent therapist statements. This measure previously demonstrated reliability and validity as a therapist training instrument (Moyers et al., 2004). In the present study, the MITI was applied to group leaders rather than individual therapists for the first time. In addition, correlations between empathy scores and other process variables were tested rather than treating empathy as a dependent measure of therapist MI training as in Moyers et al. (2004).

Commitment Language Coding Scheme

Commitment language was measured using a discourse analysis approach developed by Amrhein and colleagues, which is a new technology in process research that analyzes client speech acts in treatment. Two important advantages of this method is that it reflects actual client language (i.e., behavior) as it occurs during treatment, and it detects bivalent language (i.e., change and sustain talk).

Speech acts are utterances that describe a current state of affairs or change that state by cuing the therapist or client to alter behavior (Amrhein et al., 2003; Siegfried, 1995). Consistent with the MI perspective, this method views client speech as the product of normal conversation rather than as indicative of idiosyncratic pathology (Amrhein et al., 2003; Miller & Rollnick, 2002). In addition, since target behaviors may increase as well as decrease following an intervention, measures that reflect corresponding bivalent language and processes are valuable.

Client speech informs therapeutic process (Amrhein et al. 2003; Siegfried, 1995), and the need to examine how clients respond to an intervention as it occurs is increasingly recognized (Morgenstern, 2007). This method is preferable to the more common retrospective recall methods, which have a poor track record for measuring complex psychological processes like motivation (Morgenstern, 2007; Tennen & Afflec, 2002).

In this study, Amrhein's coding scheme was applied to adolescents for the first time and was adapted in several important ways. First, whereas Amrhein et al. (2003) examined commitment language within a single session, this study examined it across two to four of 8–10 weekly sessions. Furthermore,

Table 1. Commitment Language and Peer Response Utterance Dynamics^a

Dynamic	Commitment Language	Peer Response
Positive commitment language followed by positive peer response	"I'm going to cut way down now." "I didn't use at all last week."	"That's cool." (applause)
Positive commitment language followed by negative peer response	Same as above	"What a wimp!"
Negative commitment language followed by positive peer response	"I'll never quit." "I grow my own weed"	"You're going to die of lung cancer." "You could go to jail."
Negative commitment language followed by negative peer response	Same as above	"I saw his plant; it was cool!" (laugh)

Amrhein et al. (2003) formulated decile commitment scores, representing commitment language expressed during each 10th of the session. For example, if a session was 60 min long, a commitment score was calculated every 6 min. In this study, group commitment scores represented one to two entire sessions for each of the middle and ending phases of group development.

Second, in this study, commitment was measured for an entire group rather than at the individual level. Group commitment is distinguished from individual commitment language and constitutes a new group process constructs. Middle and ending group commitment scores represented the mean of every group member commitment utterance for that (those) session (sessions). Drawing upon general group work theory, the sum of group member commitment utterances is believed to speak for the group as a whole, including less vocal members.

Third, the content of the social learning and problem behavior theory-based TIP group curriculum was very different from the content of MI-based session by Amrhein et al. (2003). It is particularly noteworthy that commitment language expressed in the TIP groups included more statements or reports on group members' current use (e.g., "I used three times last week") than statements regarding goals for future use or more conventional commitment language (e.g., "I will quit").

Amrhein's (2004) coding scheme was also adapted to measure peer response following commitment utterances, which were similarly rated from -5 to 5. A rating of -5 was assigned to the most extreme responses in favor of substance use or opposing substance use reduction. Mean peer response scores were calculated for both middle and ending group sessions as with the group commitment scores. Like group commitment, peer response was theorized to represent the entire group. The bivalent nature of the Amrhein coding scheme and the connection between commitment language and peer response resulted in gradients of four basic combinations of positive or negative group member commitment language and positive or negative peer response, which are demonstrated in Table 1.

Group marijuana scores were calculated by averaging all scores for individuals who attended at least half of the sessions reviewed. Thus, group marijuana use scores at each follow-up period were based upon the mean DUSI-R scores of core group members.

Analyses

The sample of 19 groups for these data allowed testing of only simple limited information models using correlations. This approach accounts for neither measurement error nor clustering. Clustering was less of concern in this study than other group studies, because the data were analyzed at the group level. Clustering still occurred, however, due to overlapping group leaders and schools attended by group members. See Baldwin, Murray, and Shadish (2005) for discussion of clustering effects in group research.

Preliminary analyses involved assessing the data for violations to the assumptions of parametric statistics, including identifying missing data, model-based and non-model-based outliers, and nonnormality in the distribution of the data. When outliers were found, analyses were run including and excluding them and then compared. Null hypotheses were rejected only if correlations remained significant before and after excluding any outliers. Nonnormality was addressed by utilizing both parametric and nonparametric statistics (i.e., Pearson and Spearman correlation coefficients, respectively), which were calculated using the SPSS Version 14.0 computer program. In addition, power analyses and margins of error were assessed using the Zumastat computer program (Jaccard, 2004).

A power analysis using the Zumastat statistical software indicated that the power for this size of a sample to detect medium effect sizes (i.e., $\geq .25$; Cohen, 1988) is .19. That is, 81% of the time medium effects sizes will be missed in these correlations analyses. The sample power to detect a correlation coefficient of .55 in the true population is .80, meaning that this size of a correlation will be missed 20% of the time.

Margin of errors were calculated using the Zumastat statistical program for this sample size. For a correlation of .5, the margin of error was .45 correlation units. That is, statistically significant correlations that are .5 or greater are very likely to indicate a true effect within the data, but the actual size of the correlation coefficient ranges from .05 to .95. The margin of error for a correlation of .6 was .4 and for a correlation of .7 was .34.

Results

The Cronbach's alpha indicating the intra-class correlation (ICC) reliability for the global rating of group leader empathy

Table 2. Pearson's *r* Correlation Coefficients Among Group Leader Empathy, Group Commitment, and Peer Response^a

	1	2	3	4	5
1. Group Leader Empathy	1				
Group Commitment					
2. Middle	.623**	1			
3. Ending	.541*	.804**	1		
Peer Response					
4. Middle	.715**	.530*	.510*	1	
5. Ending	.220	.434	.412	.268	1

* $p \leq .05$.

** $p \leq .01$.

a. Middle group commitment and middle peer response involved group member language expressed during the middle sessions. Ending group commitment and ending peer response reflected group member language expressed during the last two sessions.

was .75, which was higher than that reported by Moyers et al. (2004). Empathy scores were based on the average of two raters randomly assigned to code groups. The mean empathy rating was 4.42 on the 7-point scale with a *SD* of .99.

The group commitment and peer response ICC Cronbach's alpha was calculated together and was based on a subset of session recordings and transcripts. This ICC score was .67, whereas the ICC by Amrhein et al (2003) was slightly higher at .82. Factors that likely contributed to this ICC score included the complexity of this discourse analysis coding scheme and the difference in training and expertise of the two raters. One rater received minimal training and coded a subset of sessions, which were used only to calculate interrater reliability.

The mean middle commitment score across treatment groups was .79, *SD* of 1.43, and ending commitment was 1.56, *SD* of 1.73. The mean middle peer response was -.64, *SD* 1.19, and ending peer response was -.22, *SD* 1.46. Thus, on the -5 to 5 scale, the mean group commitment scores were positive but weak, and the mean peer response scores were negative but also weak.

Due primarily to the small sample size, this study's data are exploratory. Margin of errors were calculated for this sample size. For a correlation of .5 the margin of error was .45 correlation units. That is, statistically significant correlations that are .5 or greater are very likely to indicate a true effect within the data, but the actual size of the correlation coefficient ranges from .05 to .95. Similarly, the margin of error estimates for a correlation of .6 was .4 and for a correlation of .7 was .34. Since differences between the Pearson and Spearman correlation scores were minimal, only Pearson's *r* correlation coefficients are reported. Only one correlation score was significant for the Pearson and not the Spearman coefficient, and it is noted below.

There were no missing data. One outlier within the middle peer response data was identified by both model and non-model-based tests. An outlier was defined as having a standardized DFBETA greater than an absolute value of 1.0. Therefore, results of hypotheses involving this variable are reported before and after excluding this case. In addition,

Table 3. Pearson's *r* Correlation Coefficients Among Group Commitment and Marijuana Use Outcomes

	1	2	3	4	5	6
Group Commitment						
1. Middle	1					
2. Ending	.804**	1				
Marijuana Use						
3. Posttest	-.498*	-.472*	1			
4. 1-Month	-.436	-.393	.498**	1		
5. 4-Month	-.451	-.407	.359	.273	1	
6. 12-Month	-.368	-.523*	.292	.578*	.533*	1

* $p \leq .05$.

** $p \leq .01$.

middle and ending group commitment were both leptokurtic, having absolute kurtosis scores greater than 2.

Hypothesis 1: Empathy was significantly associated with both middle (Pearson's $r = .62, p = .01$) and ending group commitment (Pearson's $r = .54, p = .02$). After excluding the outlier, the associations between empathy and middle group commitment (Pearson's $r = .64, p = .01$) and ending group commitment (Pearson's $r = .58, p = .01$) were strengthened. See also Table 2 for a summary of *hypothesis 2* correlations.

Hypothesis 2: The outlier case for middle peer response did not change the significance of the hypothesized associations. Group leader empathy was correlated with middle (Pearson's $r = .72, p = .01$) but not ending peer response. See also Table 2 for a summary of *hypothesis 3* correlations.

Hypothesis 3: Middle group commitment was significantly correlated with marijuana use at posttest (Pearson's $r = -.50, p = .05$). Ending group commitment was significantly correlated with posttest (Pearson's $r = -.47, p = .05$) and the 12-month follow-up (Pearson's $r = -.52$). Although other group commitment and marijuana use follow-up correlations did not reach significance, all were in the expected direction. See also Table 3 for a summary of *hypothesis 3* Pearson correlations.

Hypothesis 4: Middle peer response was significantly associated with posttest use both before (Pearson's $r = -.47, p = .04$) and after (Pearson's $r = -.50, p = .04$) excluding the outlier. Middle peer response was also significantly associated with 1-month marijuana use before (Pearson's $r = -.60, p = .01$) and after excluding the outlier (Pearson's $r = -.65, p = .01$). Finally, ending peer response was associated with 12-month use as indicated by Pearson's $r = -.46, (p = .01)$ but not Spearman's $r = -.39, (p = .10)$. This dynamic was not changed by the outlier. See also Table 4 for a summary of *hypothesis 4* Pearson's *r* correlations.

In sum, *hypothesis 1* was supported by the statistically significant associations between group leader empathy and both

Table 4. Pearson's *r* Correlation Coefficients among Peer Response and Marijuana Use Outcomes

	1	2	3	4	5	6
Peer Response						
1. Middle	1					
2. Ending	.268	1				
Marijuana Use						
3. Posttest	-.468	-.213	1			
4. 1-Month	-.600**	-.431	.498**	1		
5. 4-Month	.044	-.411	.359	.273	1	
6. 12-Month	-.338	-.457*	.292	.578*	.533*	1

* $p \leq .05$.** $p \leq .01$.

middle and ending group commitment. *Hypothesis 2* was supported by a statistically significant association between group leader empathy and middle but not ending peer response. Regarding *hypothesis 3*, middle and ending group commitment both significantly correlated with posttest marijuana use and ending group commitment also significantly correlated with 12-month follow-up use. For *hypothesis 4*, middle peer response was statistically significantly associated with 1-month marijuana use. Thus, statistically significant correlations were found in support of all four study hypotheses.

Furthermore, Pearson's *r* correlation coefficients between group leader empathy and marijuana use outcomes were primarily in the expected direction, ranging from .07 to $-.41$ but did not reach statistical significance. These less robust associations than between client language and marijuana use outcomes are also consistent with the proposed mediational model. Although not every association between the hypothesized study variables reached significance, at least one Pearson's *r* correlation coefficient within each hypothesis was greater than .5, making them very likely to indicate true effects, according to the margin of error calculates reported above. Therefore, all four null hypotheses were rejected.

Discussion and Applications to Practice

This study proposed a new mediation model involving group leader empathy, group member language, and marijuana use outcomes (Figure 1). Group member language consisted of two new group process constructs, group commitment and peer response. Empirical support for both group commitment and peer response as markers of marijuana use outcomes and as mediators of the effect of group leader empathy on use outcomes was found. The statistically significant associations between group leader empathy and both group commitment and peer response were consistent with the theorized role of empathy as an important group leader skill. Empathy has routinely been associated with more positive group outcomes (Yalom, 1995) and is highly associated with a number of other therapeutic features, such as cohesion (Roark & Sharah, 1989), alliance (Horvath, 1994), and group climate (Phipps & Zastowny, 1988), suggesting that these features characterize

a generally therapeutic environment (Johnson et al, 2005; Yalom, 1995). This study's findings suggest that group commitment and peer response further characterize such a therapeutic environment.

Group commitment was significantly correlated with subsequent marijuana use. This finding builds upon a previous study in which commitment language expressed by adults in a single, individual, MI session predicted substance use following treatment. In this study, commitment language expressed by adolescents in middle and ending sessions of an 8- to 10-week group treatment was correlated with marijuana use outcomes. Commitment language whether in an individual or group setting, with adults or adolescents, provides critical clues regarding clients' future substance use. Attending to such an observable, in-session, verbal behavior that reflects both positive and negative client views regarding a targeted behavior (i.e., change and sustain talk) is fundamental to MI and has important implications for adolescent group work.

Peer response was the most highly correlated process construct with marijuana use outcomes. This finding is consistent with previous studies documenting the powerful influence of adolescent peers, whether it be positive (Feldman, Caplinger, & Wodarski, 1983) or negative (Dishion et al., 1999). Concerns about negative peer influences in the treatment group setting were a major impetus for evaluating peer response in this study. Amrhein's commitment language coding scheme had not been applied in this manner before. Because it reflects both positive and negative valence language, however, it is well suited to measuring positive and negative peer processes. Assessing client ambiguity is a cornerstone of the motivational approach (Klinger & Cox, 2004; Miller & Rollnick, 2002) and complies with pleadings from those who advocate better analysis and reporting of negative treatment processes (Binder & Strupp, 1997; Dodge, Dishion, & Lansford, 2006).

Several factors make this study exploratory. First, the proposed theoretical model was derived from a larger set of variables examined in the original study that included additional group leader skills and substance use outcomes, which yielded few significant findings. See Engle (2007) for the complete rationale for excluding alcohol and other substance use. In short, there were relatively few group member language utterances that clearly pertained to alcohol or other drug use. The vast majority of group member utterances that specified a substance pertained to marijuana.

Other variables examined included specific therapist skills measured using the MITI. Behavior count ratios for complex to simple reflections, reflections to questions, open to closed questions, and MI adherent to nonadherent comments were examined as indicated by the MITI coding instructions. None of these very specific and discrete skills are nearly as well established as empathy in the treatment literature. In addition, a 20-minute segment of these leader skills based on behavior counts may not be as representative of the leader's overall performance as the global ratings of group leader empathy during the same time period. Thus, the lack of statistically significant findings pertaining to these other group leaders skills in the original study is perhaps not surprising.

Second, the small sample size and study design did not allow for statistical or experimental controls that would have more precisely defined relationships among the variables tested. In addition, for *hypotheses 1 and 2*, involving group leader empathy and client language, the temporal order was not established. However, the temporal order of the variables in *hypotheses 3 and 4*, in which both types of client language preceded substance use follow-up assessments, was consistent with the theory of causality of the model presented.

Third, most of the commitment language expressed by the group members in the study involved reporting on their previous week's use. Therefore, the extent to which commitment language associated with subsequent use better than current use alone is unknown, but the regression analyses of Amrhein et al., 2003 offer a supportive proxy in this regard, in which commitment language accounted for treatment outcome beyond intake substance use. In addition, measuring not only what the group members report regarding their use but the way in which they report it may be advantageous. See Table 1 for examples of commitment language. Moreover, there are clear advantages to measuring group member language during or within a group treatment, as it provides the researcher with numerous points of observation and many potential process variables for comparisons. However, peer response was not confounded by current use in the same way as group commitment, and it was even more highly correlated with outcomes.

The study findings provide additional support for empathy as a fundamental therapeutic skill in group work. Empathy is readily measured by coding 20-minute session segments using the MITI. This quantitative method is simple and could easily be implemented in virtually any clinical setting.

This study's findings also provide adolescent group leaders with new specific processes to observe and guidance for how to address them. Empathy was linked to both of the proposed group member language mediators. Groups with more empathetic leaders expressed less negative and/or more positive group commitment and peer response. Perhaps the more understood group members feel, the less their need to emphasize their pro use thoughts and feelings or defend the status quo. Conversely, less empathetic and/or confrontational group leaders may provoke group members to dig in and defend their position against change (Miller & Rollnick, 2002).

Expressing empathy in response to adolescent sustain talk may be somewhat counterintuitive for many group leaders, but the data in this study are consistent with such an approach. Leaders' ability to empathize with youths' thoughts and feelings both in favor of as well as against change in a group setting may encourage such change in a paradoxical manner, as suggested by Rogers (1961). That is, by feeling accepted an individual is then more inclined to consider change.

Empathizing with group members as they express sustain talk does not, however, mean evoking or reinforcing such language. Indeed, Miller (2008) contended that exploration of sustain talk is not part of MI. Rather, group leaders should respond with empathy and nonjudgmental reflections but not actively encourage or elicit sustain talk.

An alternative explanation of this study's findings regarding empathy and client language is that group leaders were more or less empathetic *in response to* group members that expressed more or less positive language. Thus, the direction of causality is unknown. The finding is consistent, however, with previous studies in which supportive versus confrontational therapist styles were experimentally controlled and preceded positive versus negative or resistant client language (Miller, Benefield, & Tonigan, 1993; Patterson & Forgatch, 1985). Although direct causal links implied in the proposed model have yet to be tested, adolescent group member sustain talk, particularly negative group commitment and peer response, should be closely observed and measured. These processes are likely associated with the deviancy training processes and iatrogenic increases in problem behavior.

The group member language coding scheme was somewhat complex. Anecdotally, however, it seems likely that a skilled group leader could recognize most positive and negative commitment and peer response utterances as such with minimal training. Peer response utterances range from overt statements of support or rejection to applause or laughing. See Table 1 for examples of commitment language and peer response dynamics. Group leaders should try to support or interrupt these positive and negative processes, respectively, but in a nonjudgmental and empathetic fashion. Finally, adolescent group leader innovation and participation in research is needed to develop techniques to influence these processes.

Further analysis should be conducted to determine whether positive or negative group member language was more influential in supporting this study's four findings. Is group member language more positive in the presence of an empathetic group leader, or less negative, or both? Was positive or negative group member language a better predictor of marijuana use?

The discourse analysis methods employed in this study could be used in future studies to examine any number of very specific processes occurring at any point during an intervention. Thus, questions regarding the temporal relationships between group leader empathy and group member language could be answered using previously developed study designs. For example, the ABAB study design used by Patterson and Forgatch (1985) to delineate the relationship between therapist empathy and client resistance could similarly demonstrate causality between group leader empathy and group member language. Such a study, however, would have to address potential ethical issues.

Furthermore, many additional processes could be informed by analyzing individual level data. Indeed, such data is needed to better understand how individual members' language changes throughout the stages of group development and in association with any number of variables, including group leader empathy and other skills and other group member language. Unfortunately, in this study it was not possible to consistently identify individual speakers throughout the group treatment. Thus, future researchers should consider taking steps to ensure that individual speakers can be readily identified. Such steps may include using individual microphones for each group member.

Future studies should utilize a full information estimation approach whenever possible. Although structural equation modeling requires larger samples, it is beneficial in testing mediators and overall models of change mechanisms.

Conclusion

This study presented and partially tested a model in which two new group process constructs were hypothesized to correlate with marijuana use outcomes and theorized to mediate the effects of group leader empathy on outcomes. A state of the art discourse analysis process research instrument was adapted and applied to the group modality in response to a consequential deficit in adolescent substance abuse intervention research. That is, the effects of adolescent group treatments range from positive to potentially iatrogenic and little is known about what distinguishes these disparate outcomes.

Statistically significant correlations were found in support of all four study hypotheses. Group leader empathy was positively correlated with both group commitment and peer response, and group commitment and peer response both negatively correlated with subsequent marijuana use.

Several implications of these findings for group work with adolescents were offered. Empathy is a critical group leader skill that should be practiced, monitored, and measured in clinical settings. Empathy may play a particularly important role in promoting positive group processes as well as deterring negative ones. Group commitment and peer response are observable, in-session, verbal behaviors that may allow group leaders to assess whether a group is promoting positive or negative behavior change. Such information is particularly important, given the lack of research available to guide adolescent group leaders faced with potentially iatrogenic group processes.

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