

# Process Predictors of the Outcome of Group Drug Counseling

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**Objective:** This study examined the relation of process variables to the outcome of group drug counseling, a commonly used community treatment, for cocaine dependence. **Method:** Videotaped group drug counseling sessions from 440 adult patients (23% female, 41% minority) were rated for member alliance, group cohesion, participation, self-disclosure, as well as positive and non-positive feedback and advice during the 6-month treatment of cocaine dependence. Average, session-level, and slopes of process scores were evaluated. Primary outcomes were monthly cocaine use (days using out of 30), next session cocaine use, and duration of sustained abstinence from cocaine. Secondary outcomes were endorsement of 12-step philosophy and beliefs about substance abuse. **Results:** More positive alliances (with counselor) were associated with reductions in days using cocaine per month and next-session cocaine use and increases in endorsement of 12-step philosophy. Patient self-disclosure about the past and degree of participation in the group were generally not predictive of group drug counseling outcomes. More advice from counselor and other group members were consistently associated with poorer outcomes in all categories. Individual differences in changes in process variables over time (linear slopes) were generally not predictive of treatment outcomes. **Conclusions:** Some group behaviors widely believed to be associated with outcome, such as self-disclosure and participation, were not generally predictive of outcomes of group drug counseling, but alliance with the group counselor was positively associated, and advice giving was negatively associated, with the outcome of treatments for cocaine dependence.

**Keywords:** group drug counseling, cocaine dependence, predictors, process ratings

Group drug counseling is offered by 93% of the drug treatment programs in the United States (Substance Abuse and Mental Health Services Administration, Office of Applied Studies, 2010). The standard model for group drug counseling in the community is an abstinence-based approach that relies upon the 12-step (Alcoholics Anonymous [AA] and similar programs) philosophy, and this approach also has been specifically applied clinically to the treatment of cocaine abuse (Ehrlich & McGeehan, 1985). In many programs, drug counseling is the only or primary intervention received by participating patients (Simpson, Joe, Fletcher, Hubbard, & Anglin, 1999).

There is some evidence that group drug counseling can be an important component of effective treatment packages. For example, the National Institute on Drug Abuse Collaborative Cocaine Treatment Study (NIDA CCTS; Crits-Christoph et al., 1999) reported that a package of manual-guided individual drug counseling (IDC) and group drug counseling (GDC) achieved superior results to cognitive therapy (CT) plus GDC, supportive-expressive (SE) psychotherapy plus GDC, and GDC alone. Noteworthy was the fact that all four of the treatment arms in the NIDA CCTS achieved very positive outcomes, and all arms included manual-based group drug counseling. Furthermore, the combination of individual plus group drug counseling was not superior to group alone on reduction in use of cocaine from baseline to the month 12 assessment, which is a remarkable finding given the substantial extra amount of treatment that patients in IDC + GDC obtained relative to GDC alone (Crits-Christoph et al., 1999). Thus, it appears as though the group counseling was an important aspect of the success of these treatments. Despite the success of the group drug counseling modality, alone or in combination with IDC, in the NIDA CCTS, there was substantial variability in patient outcomes, raising the question of whether variations in aspects of the treatment process might be associated with this variation in outcome. Group drug counseling is a specific and very common form of group counseling tailored to problems with substance abuse/dependence that shares a number of non-specific elements with other group therapy

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approaches. However, group processes (e.g., alliance, participation, self-disclosure, feedback) that have been linked to outcome in many kinds of group treatments have not been well-studied as predictors of outcome in group drug counseling. These common group processes may help to explain the wide variation in GDC outcomes.

The therapeutic alliance is one group process that has been a strong and consistent predictor of outcome in many kinds of treatment groups. A review of the group therapy literature (Johnson, Burlingame, Strauss, & Bormann, 2008) found that the alliance predicted positive outcomes in 10 of 12 studies across a range of theoretical orientations and patient populations. The only study involving a substance abuse population found that alliance in group interactional psychotherapy (not drug counseling) predicted reductions in psychological distress, but the study did not test associations between alliance and drug use (Gillaspay, Wright, Campbell, Stokes, & Adinoff, 2002). Alliance is also theoretically relevant to the GDC model used in the NIDA CCTS. The GDC treatment manual (Dailey, Mercer, & Carpenter, 1999) encourages therapists to non-judgmentally validate issues or struggles presented by group members and to be clear about the tasks and goals of therapy before problem-solving begins.

Group cohesion also predicts better outcomes in groups for many clinical populations (Johnson et al., 2008). One study (Rice & Tonigan, 2011) found that participants' perceptions of the cohesion of AA self-help groups predicted increased AA attendance. However, Gillaspay et al. (2002) failed to find effects of group cohesion on substance use consequences. The association between cohesion and reductions in substance use per se has not been tested. Furthermore, no study has examined the effects of cohesion in GDC groups on any outcome, although the GDC manual encourages counselors to "foster group cohesion and trust" (Dailey et al., 1999, p. 13). Participation in group therapy has long been believed to be an important determinant of outcome and a crucial component to the therapeutic processes of active learning, problem-solving, applying general principles to one's specific behavior, skills acquisition, and exploring feelings and behavior (Yalom, 1995). This belief has been supported by classic studies, such as Conyne and Silver (1980), which found that active group participation produced significantly more change than did simply listening to others in group, and Lundgren and Miller (1965), which found that the number of words spoken by a group participant predicted positive change. The link between participation and outcome has been confirmed in other group treatment studies as well (Cummings, Sproul, & Kiesler, 2002; Rissel et al., 1996) but has not been examined in group drug counseling. Active participation is theoretically important to GDC: Dailey et al.'s (1999) manual encourages group leaders to facilitate group interaction among clients so that all members participate and share their thoughts, feelings, and experiences.

One particular kind of participation, self-disclosure, has also been linked to positive outcomes (Crouch, Bloch, & Wanlass, 1994; Tschuschke & Dies, 1994; Tschuschke, MacKenzie, Haaser, & Jaanke, 1996) and other positive group processes (Crouch et al., 1994). In GDC, disclosure is theorized to help members relate personally and affectively to concepts discussed, rather than abstractly and intellectually. Immediacy and quality of self-disclosure is fostered in GDC by helping members to talk directly

to each other, rather than talking abstractly or only to the therapist (Dailey et al., 1999).

Feedback is a ubiquitous aspect of almost all types of psychotherapy (Claiborn, Goodyear, & Horner, 2001) and has long been held to be an integral part of group treatments (Fuhrman & Burlingame, 1994; Yalom, 1995). A number of reviews of the empirical literature on feedback in groups (Claiborn et al., 2001; Morran, Stockton, & Bond, 1991) have concluded that feedback is an important determinant of the group treatment outcomes. Feedback may help patients to become more aware of feelings, thoughts, or patterns of behavior or may provide group members with alternate perspectives on their behavior and how it affects others. Feedback, a "key component" of GDC sessions (Dailey et al., 1999), may lead to positive outcomes in GDC by encouraging and rewarding patients' positive efforts to change their substance use behaviors, by indicating areas of concern or danger that the patient may not yet see, or occasionally by addressing counterproductive activities and behaviors in a non-confrontational way.

Although frequency of generic feedback has been found to be associated with good outcomes in many kinds of group therapy, unskilled feedback such as confrontation or unwanted advice has been found to predict negative outcomes in individual drug treatment (Miller, Benefield, & Tonigan, 1993). Within the substance abuse field, confrontation on drug use and denial and telling patients what to do are not uncommon approaches. Research, however, has suggested that a confrontational style of intervention is less effective than an empathic style in the treatment of substance use disorders. Miller, Taylor, and West (1980) found that ratings of therapists on empathy highly predicted drinking outcomes at 6 months. Similar findings were reported by Valle (1981). In contrast, Miller et al. (1993) found that frequency of therapist confrontational responses were highly related ( $r = .65$ ) to drinking outcomes, with high levels of confrontation associated with poor outcomes. These findings on confrontation versus empathic style are consistent with the general group therapy literature suggesting that positive feedback is more successful than negative feedback (Morran et al., 1991). Thus, in assessing feedback as a predictor of GDC outcomes, it is important to also account for whether such feedback is generally empathic/positive or confrontational/negative and how much attempted feedback takes place in the form of advice.

One methodological consideration that is highly relevant to psychotherapy process-outcome research, but is rarely addressed, is whether a single session (or two or three sessions averaged) is adequate to yield a dependable patient level score, given session to session variability and other potential sources of variability in such scores. Dependability can be assessed using generalizability coefficients derived from variance components that estimate the population covariation between random factors (e.g., sessions, patients) and a dependent variable (e.g., rating of alliance). When dependability is not considered, relationships between variables may be attenuated due to other sources of variability without the researcher knowing that this has occurred.

A second methodological issue that is relevant to examination of process-outcome relations is whether the average process or trend in process is more relevant to positive outcomes. For example, several studies (Gelso & Carter, 1994; Kivlighan & Shaughnessy, 1995; Woody & Adessky, 2002) have suggested that measuring the trend in alliance rather than its absolute level might better

capture its relationship to outcome in both individual and group treatments, although one of these studies (Woody & Adessky, 2002) failed to find a relationship between trend in alliance and outcome. An alternate way to operationalize processes over time is to examine the impact of process variables in a given session on proximal (e.g., next session) outcomes. This approach might capture the influence of process variables even if no systematic trends in such process variables occur over sessions. No group process-outcome articles have examined processes over average, trend, and individual session levels in the same study.

The purpose of the current study was to examine the relation of process variables to the outcome of group drug counseling for cocaine dependence. Primary outcomes were monthly cocaine use (days using out of 30), next session cocaine use, and duration of sustained abstinence from cocaine. Secondary outcomes were two possible mediator variables, endorsement of 12-step philosophy and beliefs about substance abuse, previously reported to correlate with outcome in the NIDA CCTS (Crits-Christoph et al., 2003). Group processes were examined as average scores, slopes over time, and proximal (e.g., next session) predictors. We hypothesized that higher group cohesion—and both average and increasing trends over sessions in alliance, participation/self-disclosure, and feedback—would be related to better proximal and distal outcomes and improvements in mediator variables. We hypothesized that more advice on average and within sessions would predict worse proximal and distal outcomes.

## Method

### Participants

**Patients.** A total of 487 patients from five treatment sites were randomized to the four treatment conditions in the NIDA CCTS. For the current report, the patients who were randomized but did not attend any group sessions were excluded ( $N = 45$ ). All members present in a selected group session were rated for the process variables, with the exception that patients who could not be identified on videotapes (primarily because they were heard but were out of the camera view) were not included. Group sessions were originally selected with a goal of having each patient in the IDC + GDC and GDC alone groups represented in at least three sessions. However, because patients from all four study intervention conditions could be present in the same GDC sessions, patients in the SE + GDC and CT + GDC conditions were also rated. When a patient had been identified on a tape and rated at least once, further tapes were chosen to ensure that at least three sessions with that patient (if available) were rated. The final sample of 440 patients coded for participation was distributed among the treatment groups as follows: GDC alone,  $N = 110$ ; IDC + GDC,  $N = 112$ ; SE + GDC,  $N = 111$ ; CT + GDC,  $N = 110$ .

Cocaine dependent individuals were eligible to participate in the NIDA CCTS if they were 18–60 years of age, had used cocaine at least once in the past 30 days, and reported a stable living situation. Patients were excluded if they were diagnosed with current opioid dependence or opioid dependence in early partial remission, were diagnosed with dementia or other irreversible organic brain syndrome, evidenced psychotic symptoms, were a current imminent suicide or homicide risk, had a life threatening or unstable medical illness, were unwilling to discontinue a current psychotherapeutic

treatment, had an impending incarceration, were hospitalized >10 days in the past 30 days for index episode of cocaine use, were currently mandated for treatment by legal or Children and Youth Services, or resided in a halfway house at time of screening. All patients who participated in the NIDA CCTS provided written informed consent. The study protocol was approved by Institutional Review Boards connected to the participating sites.

**Counselors.** Ten group drug counselors working in community drug treatment settings served as GDC group leaders. Of these 10, eight were men, eight were Caucasian, and three had a master's degree (the rest had bachelor or associate degrees). The counselors had an average of 6.9 years of clinical experience and were 42.6 years of age (range = 30–62).

### Group Drug Counseling Treatment

Etheridge, Hubbard, Anderson, Craddock, and Flynn (1997)—integrating data from the large-scale Drug Abuse Treatment Outcome Study and the Treatment Outcome Prospective Study—have reported that drug abuse treatment in the community typically consists of counseling delivered primarily in groups, with an emphasis on abstinence from all illicit substances, including alcohol, plus a focus on urine monitoring during treatment. The group drug counseling (GDC) approach that was used in the NIDA CCTS was developed to represent this common form of drug counseling. The GDC treatment (Dailey et al., 1999) educates clients about important concepts in addiction recovery and provides a supportive group atmosphere in which members can express feelings, discuss problems, and learn to draw strength from one another. GDC uses a psychoeducational format, but it also relies heavily on group support. There are 12 standard rotating sessions covering symptoms of cocaine addiction, the process of recovery (two sessions), managing craving, relationships in recovery, self-help groups, establishing a support system, managing feelings in recovery, coping with guilt and shame, warning signs of relapse, coping with high-risk situations, and maintaining recovery.

GDC sessions (1.5 hr) were held once a week for 6 months and were free of charge. Group membership was rolling (i.e., members were added to the group as they were recruited into the study). Each of the participating five sites of the NIDA CCTS generally had 2–3 groups running simultaneously; there were 14 separate rolling groups during the course of the study. Group attendance at any given session averaged 4.43 members (range = 1–11). For the NIDA CCTS sample as a whole ( $N = 487$ ), the average number of group sessions attended was 8.6 ( $SD = 7.2$ ) for IDC + GDC, 9.5 ( $SD = 7.2$ ) for CT + GDC, 8.8 ( $SD = 6.8$ ) for SE + GDC, and 8.6 ( $SD = 7.2$ ) for GDC alone.

### Outcome Measures

Outcome measures examined (1) days using cocaine each month, (2) use of cocaine proximal to GDC sessions, (3) duration of sustained abstinence from cocaine, (4) changes in the extent to which patients endorsed the philosophy and behaviors advocated in the 12-step programs, and (5) changes in dysfunctional beliefs about substance abuse. Most outcomes were assessed monthly for 6 months following randomization. One outcome (use of cocaine proximal to GDC sessions) was assessed weekly during the same

6 months. The four monthly outcomes were predicted from both average process scores and linear trends (slopes) in processes over time. Weekly cocaine use (yes/no) was predicted from individual session process scores.

Although treatment attrition before 6 months was common, outcome data was obtained on most patients after they dropped out of treatment. For the 487 patients randomized to treatment, patients attended an average of 4.5 of the six (Months 1–6) post-baseline monthly assessment visits. At least one of the six post-intake monthly outcome assessments was obtained for 94% of the 487 patients randomized, and 85% had a 6-month assessment.

**Monthly cocaine use.** A measure of days using cocaine each month was obtained from an interview measure of drug use: the Addiction Severity Index (ASI; McLellan et al., 1992). This measure was administered at baseline and monthly for 6 months of treatment by trained, independent interviewers who were unaware of treatment assignment.

**Weekly cocaine use.** To assess cocaine use proximal to GDC sessions, two yes/no measures were examined. The first was a weekly self-report cocaine inventory that asked about cocaine use during the past week (Gawin et al., 1989). The second was weekly observed urine samples, which were sent to a central laboratory and assayed for cocaine and other drugs. These two variables were examined separately.

**Sustained abstinence.** A composite binary measure of use/no use of cocaine for each of the 6 months of active treatment was used to examine sustained abstinence. This measure was a composite of information from the monthly ASI cocaine use item, the weekly cocaine inventory, and the weekly urine sample results. The composite cocaine use outcome measure was constructed by pooling information from the three measures to code each month of treatment as abstinent versus any cocaine use. Concordance between these measures of cocaine use was reasonably good (Crits-Christoph et al., 1999). Any indication of cocaine use across the three measures would be used to designate the month as “not abstinent.” A patient in a given month was also coded as “not abstinent” if no information was available for a given month (19% of the time). The number of consecutive months of cocaine abstinence during the 6 months of assessments was used as the measure of sustained abstinence.

**Endorsement of the philosophy and behaviors advocated by 12-step programs.** This construct was assessed with the Addiction Recovery Scale (ARS; Mercer, Carpenter, & Barber, 1993). This measure is a 40-item measure, designed for this study, based on the 12-step approach to recovery. Some items reflect the 12-step philosophical system while other items measure engagement in the recommended behaviors. The total score for the ARS is obtained by summing the 40 items (each rated on a 1–5 scale), yielding a score that ranges from 40 to 200 (higher scores indicate more endorsement of the philosophy and behaviors advocated in the 12-step programs). The internal consistency reliability (Cronbach’s  $\alpha$ ) of the total of the 40 items was found to be .82 using baseline data from the NIDA CCTS. Short-term (4-week) test-retest reliability was found to be .82 in a sample of 127 pilot/training cases (Crits-Christoph et al., 2003). Change on the ARS was found to be a partial statistical mediator of drug use outcomes of IDC plus GDC (Crits-Christoph et al., 2003).

**Dysfunctional beliefs about substance use.** This construct was measured using the Beliefs About Substance Abuse Scale

(BASA; Beck, Wright, Newman, & Liese, 1993). This measure is a 20-item self-report scale that includes a list of cognitions believed to be relevant to drug use (e.g., “Life without using is boring”; “I don’t deserve to recover from drug use”) that are rated on a 1–7 scale ranging from *totally disagree* to *totally agree*. Higher scores indicate a more dysfunctional cognitions. The internal consistency reliability (Cronbach’s  $\alpha$ ) of the total of the 20 items was .86 using baseline data from the NIDA CCTS. Change in the total score on the BASA was found to be correlated with change in drug use in all three treatment individual therapy groups in the NIDA CCTS (Pearson correlations ranging from .37 to .43), with improvement in dysfunctional beliefs associated with improvements in drug use (Crits-Christoph et al., 2003).

## Treatment Process Measures

A previous article (Crits-Christoph et al., 2011) has provided information on the interjudge reliability and the dependability of the process variables used in the current report. Dependability was assessed with a generalizability coefficient (GC) calculated for scores averaging over sessions rated for each patient using a design that separated out sources of variation in these scores based on patient, counselor, time, variability in group members across groups, and rater facets and interactions among these facets. In the current context, GCs reflect the extent to which average process ratings can be generalized across these facets, ranging from 0 (indicating no generalizability of scores) to 1 (indicating complete generalizability of scores). Crits-Christoph et al. (2011) estimated GCs for various hypothetical numbers of sessions to illustrate the impact of increasing the number of sessions for which the alliance is measured on the GC. In the current report, we used the actual number of sessions to calculate the dependability of patient level scores (averaging over session) used here as predictors of outcome. Interjudge reliability was assessed with an intraclass correlation coefficients (ICCs) calculated from a generalizability approach using McGraw and Wong’s (1996) model ICC(A, 2), which indexes the degree of absolute agreement for measurements that are the average of 2 independent judges. In the case of the participation variables, ICC(A, 1) was calculated because only one judge coded most tapes.

To avoid reporting misleading negative results that are a function of low reliability, we only retained process variables that had an interjudge reliability of .70 or greater. Similarly, analyses of average session scores as predictors proceeded only with those process variables for which the average was a reasonably dependable score (GC of .70 or greater). Although generalizability coefficients of .80 or greater have been designated as adequate dependability (Cardinet, Johnson, & Pini, 2010), any cutoff score relates to the purpose of the measurement, with higher values needed when greater precision of measurement is needed. In the current context, our goal was to explore the relation of process variables to outcome, not to interpret exact scores on the process variables, and therefore we used a more liberal cutoff. For evaluating the adequacy of within-subject slopes in process scores over sessions, we examined whether or not there was statistically significant variability in such slope scores across patients. For testing the statistical significance of the random slope, quantifying the subject-to-subject variability in the rate of change of the process measures, we use a mixture of chi-square distributions of 0 and 1 degree-of-freedom as described by Verbeke and Molenberghs (2000).

**Therapeutic alliance.** The alliance was assessed using Raue, Goldfried, and Barkham's (1997) observer version of the Working Alliance Inventory (WAI; Horvath & Greenberg, 1986) because it includes a formal rater manual and has been shown to have good convergent validity with patient and therapist perspectives on the alliance (Stiles et al., 2002). The WAI is a 36-item instrument, with each item rated on a 7-point Likert-type scale. Based upon Bordin's (1979) general definition of the alliance, this scale assesses the patient's affective bond with the therapist and the agreement between patient and therapist on the goals and tasks of treatment. We evaluated each member's alliance with the group counselor (not the alliance of the group as a whole). Using Raue et al.'s (1997) version, Stiles et al. (2002) reported high internal consistency reliability for the three subscales of the WAI (Bond: .95; Tasks: .94; Goals: .94). Interrater reliability for the WAI observer scale has been reported to be .75 (for two judges pooled; Tang & DeRubeis, 1999). For the WAI total score in the current study, the ICC(A, 2) was .85, and the patient level GC based on an average over sessions was .85. There was significant ( $\chi^2_{1,2} = 9.5, p = .0054$ ) variability across patients in slopes over sessions for the WAI.

**Feedback.** Patient and counselor statements toward each targeted group member were coded using Connolly Gibbons et al.'s (2002) system, with feedback indexed as the frequency of "learning statements" in the session toward each relevant patient. Learning statements were defined as any statement that helped the patient become aware of a thought, feeling, or behavior. Such learning statements might simply point out a patient's thoughts, feelings, or behaviors; describe a causal link between a thought, feeling, or behavior; or describe a pattern of behaviors or link past behavior to present behavior. In Gibbons et al.'s study, the interjudge reliability for coding individual statements as learning statements was .77. At the level of the session, the ICC (three judges pooled) was also .77. In terms of validity, significant differences between therapists and between treatment modalities were found for the frequency of "learning statements" in Gibbons et al.'s study, suggesting that the measure was sensitive to variations in the therapeutic process.

The extent to which feedback was positive was coded using the "approval" category from the Hill Counselor Verbal Response Modes Category System (Hill, 1986). In this system for coding statements in psychotherapy sessions, "approval" statements are defined as those that provide emotional support, approval, reassurance, or reinforcement. Approval may imply sympathy or tend to alleviate anxiety by minimizing client's problems. Reliability for coding therapist statements using this system was previously reported to be .67 (per judge reliability as assessed by kappa; Hill et al., 1988). Based on this "approval" category, each learning statement was classified as positive or not positive.

In the current data, ICC(A, 2) values for positive learning statements received from counselors and from other patients were .65 and .59, respectively. GCs for average session positive learning statements received from counselors and from other patients were .33 and .34, likely due to low frequency of occurrence and less than ideal interrater agreement. These variables were therefore dropped from all further analyses. ICC(A, 2) values for non-positive learning statements received from counselors and from other patients were .78 and .74, and GCs were .88 and .59, respectively. The GC for non-positive learning statements from other patients was low due to variability over time for some

patients but not others, and variability in how similarly or differently some patients acted relative to their groupmates over time (Crits-Christoph et al., 2011). This variable was therefore dropped as a predictive variable in the analyses of average session scores. Non-positive learning statements from counselors were retained for the analyses of average session scores. There was significant variability across patients in slopes over sessions for non-positive learning statements from the counselor ( $\chi^2_{1,2} = 15.8, p = .0002$ ) and from patients ( $\chi^2_{1,2} = 15.3, p = .0003$ ).

**Self-disclosure.** This was assessed using the response mode coding system developed by Connolly Gibbons et al. (2002) adapted to patient statements rather than therapist statements. Self-disclosures were defined as statements that reveal something personal about the patient's experiences. There were two types of self-disclosures that were rated: (1) "here-and-now" self-disclosures that were statements reflective of a current emotional reaction to the group or group members, and (2) statements that described emotionally significant events in the past. Simplistic statements about drug use, such as "I used last week," were not coded as self-disclosures.

Connolly Gibbons et al. (2002) reported a reliability of .71 for self-disclosure at the level of the individual statement for three judges pooled. In the current study, the ICC(A, 2) for here-and-now self-disclosure was .64, and the GC was .58. Low dependability of an average score for this variable was likely due to low frequency of here and now self-disclosures and less than ideal interrater agreement (Crits-Christoph et al., 2011). Because of low ICCs and GCs, this variable was dropped from all further analyses. The ICC(A, 2) for past self-disclosures was .85, and the GC was .91. There was significant variability across patients in slopes over sessions for past self-disclosures ( $\chi^2_{1,2} = 27.46, p < .0001$ ).

**Advice.** During training of judges in the rating of the above feedback variables on group drug counseling sessions, it became apparent that another type of feedback, general advice, was commonly employed by group drug counseling. To capture this common aspect of these sessions, and to differentiate "learning statements" from general advice, additional variables relating to general advice from the counselor and general advice from other group members were added to the project. Following the system of Connolly Gibbons et al. (2002), a statement was considered "advice" if it instructed the patient to do something. However, if the statement referred to a past or present thought, feeling, behavior, defense, or motivation, it was coded as a learning statement even if it also had elements of advice. Thus, the advice category captured advice statements that did not help the patient learn about thoughts, feelings, behaviors, defense, or motivation. The ICC(A, 2) for advice statements received from the counselor was .76, and the patient level GC was .77. The ICC(A, 2) for advice statements received from other patients was .82, and the GC was .82. There was significant variability across patients in slopes over sessions in advice statements from the counselor ( $\chi^2_{1,2} = 12.96, p < .001$ ) and from other patients ( $\chi^2_{1,2} = 6.05, p = .03$ ).

**Participation.** Measures of participation included total time talking (excluding counselor talk time) and number of turns-at-talk in each group session by each patient. Turns-at-talk that were less than 3 s in duration (e.g., brief utterances such as "uh-huh") were excluded from analyses. The ICC(A, 1) for total time talking was .92; for number of turns-at-talk, it was .88. The patient level GCs for these

variables were both .99. There was significant variability across patients in slopes over sessions for total time talking ( $\chi^2_{0:1} = 56.3, p < .0001$ ) and number of turns-at-talk ( $\chi^2_{0:1} = 65.0, p < .0001$ ).

**Group cohesion.** The Harvard Health Plan Group Cohesiveness Scale (Budman et al., 1982, 1989) was used to evaluate overall cohesion for each rated group session. This scale defines cohesion as group connectedness evidenced by working together toward a common therapeutic goal, constructive engagement around common themes, and openness to sharing personal material. The scale consists of the following separate items that are rated by trained judges: focus, interest/involvement, trust, facilitative behavior, and bonding, as well as a global cohesiveness rating. Each of these items is rated on a 1 (*very slight*) to 9 (*very strong*) scale. Budman et al. (1989) conducted a principal components analysis of the scale and reported that the six items loaded on one component. Thus, we averaged the six items to create an overall cohesiveness score for each rated session. In the current sample, the internal consistency reliability (Cronbach's alpha) for this total score was .91, the ICC(A, 2) for total score was .97, and the GC for the total score was .88. An average patient level group cohesion score was created by averaging over the sessions attended by each patient that were rated for cohesion. Thus, in the context of rolling groups, this cohesion score for each patient represented the typical level of group cohesion to which each patient was exposed. However, analysis of the dependability of these patient level group cohesion scores yielded a GC of .55. Because of this lack of dependability, these patient level group cohesion scores were not used as predictors.

## Raters and Procedures

**Alliance, feedback, advice, and self-disclosure.** Five judges, all experienced clinicians with a master's or doctoral degree, were hired to provide ratings of the observed sessions on the alliance, feedback, advice, and self-disclosure instruments. All judges had previously worked as raters in psychotherapy studies.

Judges were trained over the course of 2 months. The training consisted of review and discussion of instruments, rating of five training tapes, and discussion of discrepancies between judges. While rating actual study sessions, judges participated in monthly (total of 12) recalibration sessions to maximize reliability and prevent rater drift. Non-study tapes were used for these recalibration sessions. The judges completed independent ratings of 387 separate GDC videotapes. There were a total of 417 patients present in one or more of these GDC sessions. On average, each patient was present in an average of 3.86 separate group sessions. The median 1st, 2nd, 3rd, and 4th tapes for patients were Sessions 2, 5, 7, and 9. Each tape was rated by two judges using a balanced incomplete block design to assign raters to tapes.

**Cohesion.** Two doctoral clinicians (included in the five that rated alliance, feedback, advice, and self-disclosure) who had clinical and research experience with group therapy approaches rated group cohesion. Training and re-calibration for the cohesion ratings were done using the same procedures used for the alliance, feedback, and self-disclosure ratings. There were 76 GDC session videotapes rated for cohesion. These tapes were randomly chosen from among the 387 tapes rated on alliance, feedback, advice, and self-disclosure.

**Participation.** Because the participation variables were based on the number of turns at talk and time of speaking, non-clinically trained judges were used for coding participation. Twenty-seven undergraduates were trained to code participation in the GDC sessions. Following training, these judges participated in monthly meetings to address any problems or questions. Participation was coded in 1,030 group sessions that included a total of 440 patients, with each patient present in an average of 5.9 group sessions. Each session of the 1,030 sessions was coded by one judge; a second judge coded 57 of the 1,030 tapes to assess interjudge reliability.

## Statistical Analysis

Several of the rated process variables had non-normal distributions, as evidenced by a statistically significant Shapiro-Wilk test with a value of the test statistic less than .90. A Box-Cox transformation analysis (Box & Cox, 1964) was then conducted for each of the non-normal variables. This resulted in several of the count variables (non-positive learning statements from counselor and from others; advice statements from counselor and from other patients) recoded as binary (no such statements vs. any such statements in a session). Average patient level scores for alliance, feedback, advice, self-disclosure, and participation variables were calculated by averaging over all available ratings made on each patient from group sessions attended by each patient.

The primary statistical analysis consisted of three analytic structures which were dependent on the nature of the outcome of interest: correlation analysis, mixed-effects model analysis, and generalized estimating equations (GEEs). For the count of consecutive months abstinent, partial correlation models were used to assess the relation of the process measures with consecutive months of abstinence. The monthly days used, monthly ARS, and monthly BASA were analyzed via a general mixed model approach. We implemented this model with PROC MIXED in SAS (Littell, Milliken, Stroup, Wolfinger, & Schabenberger, 2006) and predicted average outcome over the 6-month treatment period, rather than assuming a linear change over time, adjusted for the baseline measure. Unlike standard repeated measures analysis of variance (ANOVA), this approach permits flexibility in the assumptions made about the covariance structure of the multiple assessments. We specified a Toeplitz structure, which assumes a common variance over the repeated assessments and a common covariance between assessments equally spaced, but allows assessments made closer together in time to not necessarily be correlated in the same way as assessments separated by longer time intervals. A likelihood ratio test revealed that this covariance structure fits better than the compound symmetry, first-order autoregressive covariance structures, as well as the unstructured design. This modeling structure assumes near normal outcome measures. Examination of the days used cocaine monthly outcome measure indicated deviations in normality at each assessment which was corrected through a square-root transformation. Predictor variables were examined in these models as average session scores and separately as scores that were within-subject slopes over sessions. Preliminary analyses examined the extent to which variability in the outcome measures was a function of rolling group ( $N = 14$ ) membership. The percentage of total variance due to rolling group was found to be minimal on all outcome measures (monthly days used cocaine: 1.9%; number of consecutive months abstinent:

1.4%; ARS: 0.0%; BASA: 0.0%). Because of this, rolling group membership was not incorporated into the statistical model (i.e., predictions were not made at the rolling group level of analysis). Because cohesion could not be measured adequately at the patient level, and there was not sufficient variability between rolling groups to conduct analyses at the group level, no further analyses were conducted with cohesion scores.

For prediction of proximal outcomes (weekly urines and cocaine inventory), where patients are denoted as “users” or “abstainers” per week, we implemented GEE models (Liang & Zeger, 1986). In these models, we predicted next week cocaine use from current week process measures, controlling for current week cocaine use. The GEE approach was used to account for the correlation of the repeated measures for each patient over time and was implemented using SAS Version 9.2. Overall odds ratios for the process measures in relation to next week cocaine use were generated. When comparing between two models, it is customary to turn the odds ratio into a percentage by subtracting the odds ratio from 1 and multiplying by 100%. A positive percentage would indicate an increase in the odds for usage per unit increase in the process measure. A negative percentage would indicate a decrease in the odds for usage per unit increase in the process measure. To make the odds ratio more meaningful per process measure, continuous process measures were standardized; hence, the odds ratios correspond to an increase/decrease in the odds per standard deviation increase in the process measure.

All three modeling structures allow for the inclusion of covariates in addition to baseline or past-week values of the target outcome measure. The a priori covariates used in the primary outcome analyses for the NIDA CCTS were also used here (Crits-Christoph et al., 1999). These covariates were treatment group, site, baseline psychiatric severity, and external coping style measured at baseline using the Socialization Scale of the California Psychological Inventory (Megargee, 1972).

## Results

### Baseline Demographic and Clinical Characteristics of Sample

In order to examine the representativeness of the samples with process ratings relative to the entire randomized NIDA CCTS

sample, baseline demographic and clinical data for each of these samples are shown in Table 1. The sample of patients rated on alliance, feedback, self-disclosure, and advice ( $N = 417$ ) were found to be slightly older than those within the full sample of 487 patients that were excluded ( $N = 70$ ),  $t(485) = 1.97, p = .049$ . No other significant differences were apparent for the samples of patients included, versus excluded, from the total randomized sample. Means and standard deviations of the variables of the final variables are provided in Table 2, along with the percentage of total variance in each variable that is attributable to differences between the 14 rolling groups. Correlations among the process variables are provided in Table 3.

### Prediction of Outcome From Average Session Process Scores

Table 4 presents semipartial correlations of the process variables in relation to the outcome measures. In the prediction of consecutive months of abstinence, two univariate predictors were statistically significant: advice statements from counselors and advice statements from other patients. Greater use of advice statements predicted fewer consecutive months of abstinence and more days using cocaine per month (more advice associated with more cocaine use). In addition, a positive alliance with the counselor was significantly associated with fewer days using cocaine per month. There were no other significant univariate associations between average process variables and days using cocaine per month.

In the prediction of change on the Addiction Recovery Scale, the alliance was a highly significant ( $r = .21, p < .001$ ) predictor. The stronger the alliance with the group counselor, the more the patient increased their engagement in behaviors/philosophy consistent with the 12-step model of addiction. Receiving non-positive learning statements from the counselor, and receiving advice statements from the counselor, were significantly negatively associated with change in the ARS: Those patients who received more of such statements from the counselor were less likely to increase their engagement in the recommended 12-step behaviors. Similarly, non-positive learning statements from the counselor, advice statements from the counselor, and advice statements from other patients were all significantly associated with change on the BASA. The direction of these effects was the same: The more a patient received non-positive learning statements and advice statements,

Table 1  
*Demographic and Clinical Characteristics of the Original Study Sample and Samples Rated on Process Measures*

Characteristic	Original full study sample ( $n = 487$ )	Alliance, feedback, self-disclosure, and advice ratings ( $n = 417$ )	Participation coding ( $n = 440$ )
% non-minority	57.9	58.3	58.6
% employed	60.3	59.9	60.6
% living alone	69.6	69.1	69.6
Primary route of cocaine administration			
% crack smokers	79.1	79.5	79.1
% injectors	2.1	2.2	2.1
% snorters	18.9	18.3	18.8
% male	76.8	76.5	77.1
Age, $M \pm SD$	33.9 $\pm$ 6.30	34.1 $\pm$ 6.39	33.9 $\pm$ 6.29
Years education, $M \pm SD$	13.0 $\pm$ 2.00	13.0 $\pm$ 2.06	13.0 $\pm$ 2.02
Days cocaine past 30, $M \pm SD$	10.4 $\pm$ 7.76	10.5 $\pm$ 7.71	10.5 $\pm$ 7.74
Years cocaine use, $M \pm SD$	6.9 $\pm$ 4.75	6.8 $\pm$ 4.69	6.9 $\pm$ 4.73
Days alcohol past 30, $M \pm SD$	7.4 $\pm$ 7.89	7.4 $\pm$ 7.91	7.4 $\pm$ 7.91

Table 2  
Descriptive Statistics for Process Variables

Variable	No. of patients	<i>M</i>	<i>SD</i>	Range	% variance due to rolling group
Alliance: WAI total score	416	187.3	29.0	95–242	11.4
No. of self-disclosures					
Past	417	7.57	5.32	1–23	7.5
Participation variables					
Total time speaking per session (minutes)	440	1.25	0.88	0.1–3.9	3.1
No. of turns at talk per session	440	19.8	13.0	4–52	8.0
Binary variables	No. of patients	<i>N</i>		%	% variance due to rolling group
Non-positive learning statements					
Received from counselor	417	221		53	8.8
Received from other patients	417	288		69	2.3
Advice statements					
Received from counselor	417	209		50	4.4
Received from other patients	417	142		34	3.2

*Note.* Means are per session. For the alliance, learning statements, self-disclosure, and advice variables: 10 counselors, 14 rolling groups, 387 specific group sessions (tapes), 3.86 sessions per patient. For the participation variables: *N* = 440 patients, 10 counselors, 14 rolling groups, 1,030 specific group sessions (tapes), 5.9 sessions attended on average per patient. Non-positive learning statements and advice statements are binary variables (recoded as present or absent in each session). WAI = Working Alliance Inventory.

the less improvement in distorted beliefs about addiction was evident. A greater number of turns-at-talk in sessions was also associated with less improvement in dysfunctional beliefs about substance abuse.

### Prediction of Outcome From Linear Trend Over Sessions Process Scores

Patients who had a positive trend (linear slope) over GDC sessions in the receipt of advice statements from other patients had significantly fewer consecutive months of abstinence (see Table 4). Similarly, a positive trend over sessions in advice statements from other patients was associated with less improvement in days using cocaine per month. Patients who had an increasing number of non-positive learning statements from other patients also had significantly more days using cocaine per month. A linear trend over sessions in any of the process variables was not predictive of change on the mediator variables (12-step endorsement and beliefs about substance use).

### Prediction of Proximal Cocaine Use Outcomes

Odds ratios from the prediction of weekly use/non-use of cocaine, as measured by urines and self-report obtained prior to the next group session, from process variables are given in Table 5. Lower alliance with the counselor at a given GDC session significantly predicted drug use at the next session, controlling for use/non-use in the week prior to the session on which the process ratings were conducted for both the urine and self-report measures of cocaine use. Accounting for prior week use of cocaine, a one standard deviation increase in alliance decreased the odds of next-week use by 21.1% (urines) and 22.4% (self-report). Accounting for prior week use, advice statements received from other patients significantly predicted next session cocaine use as measured by urinalysis, but not by self-reported use, with more advice

statements associated with a greater tendency to use cocaine in the week. No other process variables were associated with next-session cocaine use.

### Discussion

In this study, we failed to find evidence that certain process variables, central to the concepts of group therapy and found to predict outcome in studies of group therapy, were associated with the outcomes of treatment for cocaine dependence. In particular, measures of self-disclosure and participation in group sessions were unrelated to sustained abstinence, monthly days using cocaine, next session cocaine use, and change in endorsement of 12-step philosophy; more turns-at-talk was actually related to less improvement in dysfunctional substance use beliefs. However, a positive alliance with the group counselor was found to be associated with both longer-term (over 6 months) reductions in cocaine use and proximal (next session) cocaine use, and increases in the endorsement of 12-step philosophy. In addition, we found that giving advice to patients was a negative predictor: Patients who received more advice (from the counselor or other patients) had worse monthly, weekly, and long-term drug use outcomes and showed relatively less change on two important mediators of outcome (endorsement of 12-step philosophy and beliefs about substance abuse). Receiving non-positive learning statements from the counselor was also associated with less improvement in endorsement of 12-step philosophy (though this variable was highly correlated with advice statements from counselor:  $r = .65$ ).

Our finding of a positive association between average alliance scores across sessions and more positive outcomes are consistent with the general literature on the alliance in group (Johnson et al., 2008) and individual psychotherapy (Horvath, Del Re, Flückiger, & Symonds, 2011). However, alliance with individual therapy counselors in the NIDA CCTS was not found to predict drug use outcomes (Barber et al., 2001). Alliance with the group counselor



Table 3  
Intercorrelations Among Process Variables

Process variables	Process variables															
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Means over sessions as scores																
1. Alliance: WAI	.04	.06	.57*	-.04	.12*	.38*	.32*	-.08	.02	.00	.05	-.01	-.04	-.08	-.06	
Non-positive learning statements																
2. Received from counselor		.37*	.40*	.65*	.31*	.34*	.43*	-.08	.05	.19*	-.02	-.16*	-.01	-.11*	-.13*	
3. Received from patient			.27*	.38*	.65*	.21*	.30*	.01	-.03	.15*	.04	-.04	.03	-.05	-.07*	
4. Self-disclosures: Past				.25*	.28*	.72*	.66*	-.04	.10	.09	.13*	.04	-.01	-.21*	.16*	
Advice statements																
5. Received from counselor					.44*	.18*	.29*	-.08	-.01	.28*	-.03	-.17*	.12*	.01	.01	
6. Received from patient						.17*	.31*	.04	-.04	.14*	-.05	.04	.15*	-.02	-.04	
Participation																
7. % time speaking							.77*	-.03	.03	-.01	.12*	.06	-.05	-.09	-.10*	
8. No. of turns at talk								.02	.02	.09	.11*	.06	.01	-.16*	-.15*	
Intra-individual slopes as scores																
9. Alliance: WAI									-.03	.01	.33*	.39*	.09	-.12*	-.15*	
Non-positive learning statements																
10. Received from counselor										.55*	.39*	.21*	.48*	-.10	-.14*	
11. Received from patient											.40*	-.05	.45*	-.03	.01	
12. Self-disclosures: Past												.32*	.17*	-.11*	-.22*	
Advice statements																
13. Received from counselor													.49*	-.04	.10	
14. Received from patient														.14*	.24*	
Participation																
15. % time speaking															.77*	
16. No. of turns at talk																

Note. WAI = Working Alliance Inventory.  
\*  $p < .05$ .

may have been more important to outcomes than alliance with individual counselors because urine drug screens and weekly drug use assessment measures took place at group counseling sessions, making the group counselors' reactions to clients' behavior more

salient. Furthermore, the counselor's reactions to a client's behavior occurred in front of a group of peers, potentially also making the group counselors' reactions more salient. The fact that the alliance with the GDC counselor did predict drug use outcomes

Table 4  
Prediction of Consecutive Months Abstinence and Proximal Outcome From Average Process and Linear Trend in Process Scores

Process variable	Consecutive months abstinent		Days using cocaine per month		Addiction Recovery Scale		Beliefs about Substance Abuse Scale	
	Average process	Trend in process	Average process	Trend in process	Average process	Trend in process	Average process	Trend in process
Alliance: WAI total score	.06	-.06	-.13**	.09	.21***	-.06	-.08	.01
Non-positive learning statements								
Received from counselor	-.10	-.02	.05	.05	-.14**	.01	.14**	.03
Received from patient	NT	-.11	NT	.17**	NT	-.11	NT	.06
Self-disclosures								
Past	-.02	-.03	-.07	-.02	.08	.07	.07	-.02
Advice statements								
Received from counselor	-.18***	.01	.18***	.07	-.19***	.10	.17**	-.04
Received from other patients	-.11*	-.13*	.08	.24***	-.08	-.09	.21***	.04
Participation								
% time speaking	.01	-.04	-.10	.07	.04	-.06	.02	.10
No. of turns-at-talk	-.01	.00	-.07	.04	-.06	-.05	.13*	.06

Note. For the alliance, learning statements, self-disclosure, and advice variables:  $N = 417$  patients, 10 counselors, 14 groups (rolling membership), 387 specific group sessions (tapes). For the participation variables:  $N = 440$  patients, 10 counselors, 14 rolling groups, 1,030 specific group sessions (tapes). High scores on consecutive months abstinent and the Addiction Recovery Scale indicate greater improvement; low score on days using cocaine and the Beliefs About Substance Abuse Scale indicates greater improvement. Correlations were adjusted for site, treatment condition, baseline psychiatric severity, baseline internalization/externalization, and the baseline measure for the respective outcome. WAI = Working Alliance Inventory; NT = not tested due to low generalizability coefficient.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 5  
*Prediction of Cocaine Use During the Next Week Following GDC Sessions From  
 Process Variables*

Process variable	Next week use urinalysis	Next week use self-report
	Odds ratio [95% CI]	Odds ratio [95% CI]
Alliance: WAI total score	0.81* [0.67, 0.99]	0.79* [0.67, 0.95]
Participation		
% time speaking	0.99 [0.84, 1.18]	0.95 [0.81, 1.11]
No. of turns at talk	0.98 [0.83, 1.16]	0.99 [0.85, 1.16]
No. of self-disclosures		
Past	1.05 [0.86, 1.29]	0.94 [0.78, 1.13]
No. of non-positive learning statements		
Received from counselor	0.89 [0.58, 1.37]	1.24 [0.89, 1.74]
Received from patient	1.16 [0.77, 1.74]	1.22 [0.89, 1.67]
No. of advice statements		
Received from counselor	1.18 [0.80, 1.73]	1.14 [0.83, 1.56]
Received from other patients	1.64** [1.16, 2.30]	1.01 [0.74, 1.36]

*Note.* For the alliance, learning statements, self-disclosure, and advice variables:  $N = 417$  patients, 10 counselors, 14 rolling groups, 387 specific group sessions (tapes). For the participation variables:  $N = 440$  patients, 10 counselors, 14 rolling groups, 1,030 specific group sessions (tapes). Odds ratios were adjusted for site, treatment condition, baseline psychiatric severity, baseline internalization/externalization, and the current week use/non-use of cocaine. GDC = group drug counseling; CI = confidence interval; WAI = Working Alliance Inventory.

\* $p < .05$ . \*\* $p < .01$ .

adds further support to the conclusion that GDC was an important aspect of the overall treatment package, at least for some patients, in the NIDA CCTS.

It is also of interest that average alliance scores predicted changes on a potential mediator of drug use outcomes: endorsement of 12-step philosophy. In the context of a strong alliance, some patients may begin to adopt the counselor's philosophical system regarding addiction in order to facilitate the ongoing positive relationship with the counselor. Alternatively, the alliance might be setting the stage for counselor interventions regarding the importance of 12-step-related behaviors to take hold with some patients.

Our finding that the session-level alliance predicted subsequent (next session) use of cocaine, controlling for current use of cocaine, adds further strength to the assertion that the alliance may play an important role in the treatment process. Of course, the roles of other third variables in producing this correlation have not been ruled out, and therefore a potential causal role for the alliance needs to be further investigated. If the alliance does indeed play a causal role, either directly or indirectly through setting the stage for interventions to be effective, a possible fruitful direction for increasing the effectiveness of group drug counseling would be to incorporate techniques to enhance the alliance into the treatment package. Techniques from motivational interviewing (Miller & Rollnick, 2002), or from alliance-fostering therapy (Critt-Christoph et al., 2006), could be integrated into GDC to accomplish this.

Advice at both the session level and averaged over sessions was negatively associated with session level outcomes and longer-term outcomes. In fact, advice was the most consistent predictor of outcome in the study. The reason why advice by counselors and other patients is a negative predictor of outcome is not known. Previous individual treatment studies have found that adopting a style of telling patients what to do (e.g., therapist behaviors of

“teach” and “confront”) actually increases resistance in the moment (Patterson & Forgatch, 1985) and that therapist confrontation increases drinking (Miller et al., 1993). Miller (2010) has also pointed out that normal human responses to a direct/teach/confront style are to feel invalidated, resist, and withdraw. Therefore, advice may come across as condescending to patients (they have heard it many times before) or not personally relevant to the particular issues each patient is confronting. It may also be that our process variable of general advice is a marker for some other important variable (e.g., low counselor competence in implementing GDC; other patients “ganging up” on one patient and instructing the patient what to do with their life), or that patients were more likely to receive advice if they were already having trouble. However, the finding that, given current week substance use, patients receiving advice from other patients were more likely to continue to use suggests that less empathic reactions from others may lead, rather than purely follow, cocaine use. The moderately strong association between advice and poorer outcomes suggests that the GDC manual should be modified to instruct GDC counselors to avoid such general advice statements and to have GDC counselors socialize members of a group to also not provide advice to others.

It is not clear why participation and self-disclosure were either not related to outcome in this study or predicted slightly worse secondary outcomes. One potential explanation is that more group time may have been devoted to participants who were having difficulties. Alternatively, high scores for one patient on number of turns-at-talk may indicate a lack of group cohesion, and this poor cohesion leads to worse outcomes. In any case, it may be useful for therapists to be aware that members of drug counseling groups who are talking the most may not be the members who are improving the most.

Predictive findings were evident for average levels of process variables across sessions and for next-session outcomes, but indi-

vidual variation in linear trends across sessions was generally not predictive of outcome. Exceptions were that a greater tendency for a linear increase in advice statements, and linear increase in non-positive learning statements from other patients, were associated with more monthly cocaine use. Trends in process variables over sessions may not have been as predictive of outcome as average and session-level process variables in the current study for several reasons. The number of sessions sampled here (3.86 per patient, on average, for most variables; 5.9 for participation) may have been too few. Another factor affected such trends may have been the use of rolling groups, which do not as closely follow the stages of group development observed in closed groups (Schopter & Galinsky, 1990). Further research with non-rolling group drug counseling, and sampling of a larger number of sessions, will be needed to sort out these potential influences.

Several limitations of this study are important to note. Although group drug counseling is a common modality of treatment, it is not known whether the results of the current study generalize to the wide variety drug counseling groups available in community settings, or to different types of substance abuse/dependence. As mentioned, though it increased external validity, employing rolling groups is another potential limitation. The absolute level and development of process variables over time may be different in closed groups versus rolling groups. Another limitation was that group cohesion, often viewed as an important process variable in group treatment, was not be examined as a predictor here because it could not be measured adequately as a patient level variable and because of a lack of variability in the outcome measures at the group level of analysis. This latter issue also applied to examination of the other process variables at the group level of analysis. A final limitation is that other process variables, not measured here, may be predictive of outcome in GDC. In particular, technique variables may predict outcome, either alone or in combination of non-specific variables like the alliance. Further studies should examine the joint contribution of GDC technique variables and general group process variables in relation to the outcome of GDC.

Despite these limitations, the current study underscores the potential importance of the therapeutic alliance in GDC, highlights risks associated with advice-giving, and casts doubt on group participation as an indicator of improvement in group drug counseling, an extremely commonly used community treatment. Findings also have methodological implications for process-outcome research. Differences and similarities in findings using different temporal sequences of processes (e.g., session averages, slopes, and session-level variables) demonstrate the importance of clearly conceptualizing the timing of processes and outcomes of interest, and of ensuring that measurement timing corresponds to the conceptualization as closely as possible. Results also illustrate the necessity of ensuring that process scores are dependable (i.e., can be relied upon to be representative and therefore results are interpretable) before using them in process-outcome research.

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