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# Change Talk in a Group Motivational Interviewing Setting and Risk Reduction Among Homeless Young Adults

Leslie Marie Mullins



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This document was submitted as a dissertation in August 2015 in partial fulfillment of the requirements of the doctoral degree in public policy analysis at the Pardee RAND Graduate School. The faculty committee that supervised and approved the dissertation consisted of Joan Tucker (Chair), Kathryn Derose, and Lisa Blakely.



This dissertation is dedicated to the loving memory of Frank Mullins who left this world on

April 27, 2014

"I thank my God, upon every remembrance of you."

Philippians 1:3

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## **Abstract**

Over the past thirty years, Motivational Interviewing (MI) has been used to elicit change in a wide range of behaviors. During an MI session, the counselor uses open-ended questions and reflections to elicit behavior modifying language. This language is referred to as “change talk” (CT). MI is usually conducted in one-to-one sessions. However, in many service delivery settings (such as drop-in centers for homeless youth), staff time and other resources are too limited to be able to offer this type of individual counseling. MI delivered in a group setting is more feasible and thereby more likely to be sustainable in community-based settings. For this reason, there has been growing interest in delivering MI in group settings. However, few group MI interventions have been rigorously evaluated, and there is a need to better understand how group MI works in predicting client behavior change.

Studies to date that have coded client and counselor responses during a MI session have used a variety of instruments including Motivational Interviewing Skill Code (MISC) and Sequential Code for Observing Process Exchanges (SCOPE). These coding mechanisms are labor extensive, require multiple coders and extensive training, and are designed for use with individualized sessions. A streamlined method to parse and code client language during group-level MI sessions was developed for this study to examine how CT and CCT during a group-level MI intervention are related to changes in client attitudes, intentions, and behaviors over a three month time period. Results are based on 68 homeless young adults (ages 18-25) who participated in AWARE, a four session group-level MI risk reduction program focusing on substance use and HIV risk.

The results of this study were promising. Exposure to CT and CCT during the group-level MI sessions predicted changes in participants’ illicit drug use other than marijuana and their attitudes about changing their alcohol use (although not changes in actual alcohol use). Exposure to CT and CCT also predicted changes in participants’ condom use and sexual protective strategies, although it was not associated with the number of sexual partners or condom-related attitudes.

There are only three published studies of coding client language in group-level MI, each focusing solely on substance use outcomes. This study is unique and adds to this small literature in three important respects: (1) it develops and utilizes a streamlined parsing and coding method that is more feasible to use in research and clinical settings; (2) it is the first study to examine how exposure to CT and CCT during a group-level MI intervention is related to client behavior change among homeless young adults, a highly vulnerable, yet understudied population; and (3) it is the first study to examine how exposure to CT and CCT is related to both substance use and sexual risk behavior outcomes.

The results of this study should be of interest to policymakers, researchers and practitioners who are seeking to expand the evidence-based literature for health-related risk reduction interventions targeting homeless youth. If effective and widely utilized, the proposed streamlined MI coding process would greatly decrease the amount of resources needed to examine the effects of non-judgmental, collaborative, evidence-based group MI interventions, similar to the pilot intervention examined in this study.

## **Chapter 1: Introduction**

### **Substance use and Risky Sexual Behavior**

Homeless youth are exposed to a plethora of negative habit forming conditions including illicit drug use, excessive alcohol consumption, and misuse of prescription and over-the-counter medications (Ginzler, Cochran, Domenech-Rodriguez, Mari Cauce, & Whitbeck, 2003; Johnson, Whitbeck, & Hoyt, 2005; Rice, Milburn, Rotheram-Borus, Mallett, & Rosenthal, 2005; Tucker, Edelen, Ellickson, & Klein, 2011; Wenzel, Tucker, Golinelli, Green, & Zhou, 2010). Substance use enables many youth to deal with the stresses of homelessness and an impoverished environment (Ayerst, 1999; Dashora, Erdem, & Slesnick, 2010; Kidd & Carroll, 2007; Klee & Reid, 1998; Unger et al., 1998; Wong et al., 2013).

Homeless youth have higher rates of hepatitis B and C (Nyamathi et al., 2005), and are estimated to be 6-12 times more likely to acquire HIV and other sexually transmitted diseases (Rotheram-Borus et al., 2003), than their non-homeless peers. Studies examining risky sexual behaviors found that at least a quarter of homeless youth engage in survival sex and have traded sex for food, shelter, money, or drugs (Greene, Ennett, & Ringwalt, 1999; Haley, Roy, Leclerc, Boudreau, & Boivin, 2004; Heerde & Hemphill, 2015; Tyler & Johnson, 2006; Walls & Bell, 2011). Other work has found that 60% of homeless youth reported engaging in unprotected sex during their most recent sexual event (Tucker, Ryan, et al., 2012). There are a number of factors that contribute to engagement in risky sexual behaviors among homeless youth, such as peer influences and ambivalence towards sexually transmitted infection, pregnancy, and other consequences of unprotected sexual relations (Gangamma, Slesnick, Toviessi, & Serovich, 2008; Halcón & Lifson, 2004; Rice, Milburn, & Rotheram-Borus, 2007; Rosa, Montgomery, Hyde, Iverson, & Kipke, 2001; Solorio et al., 2008; Tucker, Hu, et al., 2012; Tucker, Sussell, et al., 2012). Exposure to sexual predators and economic hardships may also make it challenging for youth to assert their sexual rights (Farley, 2003; Gaetz, 2004; Hagan & McCarthy, 2005; Heerde & Hemphill, 2015). Importantly, a number of studies have found that illicit drug use and excessive drinking are associated with increased sexual activity and risky sex among homeless youth, including evidence from event-level studies (Bailey, Camlin, & Ennett, 1998; Martino et

al., 2011; Rew & Fitzgerald, 2001; Rotheram-Borus, Mahler, Koopman, & Langabeer, 1996; Tucker, Ryan, et al., 2012; Tyler, 2008; Walls & Bell, 2011). Given the interrelated nature of substance use and risky sex, interventions will likely be more effective if they simultaneously address both of these behaviors than either one alone (Bryan, Ray, & Cooper, 2007; Lewis, Neighbors, Lee, & Oster-Aaland, 2008; Lewis et al., 2014).

Interventions are necessary for this population to reduce their risky sexual behavior and substance use, and increase their ability to employ protective strategies. Interventions for homeless youth directed specifically at modifying risky sexual behaviors and substance use often face challenges with implementation because homeless youth are transient, experience high levels of physical, emotional, and mental health problems, including depression, suicidal behavior, post-traumatic stress disorders, and conduct disorders (Anderson, Freese, & Pennbridge, 1994; Bender, Ferguson, Thompson, Komlo, & Pollio, 2010; Chen, Thrane, Whitbeck, & Johnson, 2006; Chen, Thrane, Whitbeck, Johnson, & Hoyt, 2007; Merscham, Van Leeuwen, & McGuire, 2009; Sibthorpe, Drinkwater, Gardner, & Bammer, 1995; Solorio, Milburn, Andersen, Trifskin, & Rodríguez, 2006; Whitbeck, Hoyt, Johnson, & Chen, 2007). It is critical for social service providers to identify interventions that are not only effective with this population, but interventions that the youth are open to receiving.

### **Homeless Interventions**

In 2011, Naranbhai, Abdool, and Meyer-Weitz reviewed 255 studies of HIV interventions for homeless youth. They found that only three interventions fit their criteria for randomized controlled trials that have evaluated both self-reported behavioral outcomes and HIV/STI status pre/post intervention. Unfortunately, all three trials had significant reporting and attrition bias due to incomplete outcome reporting and significant and differential follow-up rates in intervention and control groups. Discrepancies make it difficult to interpret the effectiveness of interventions to modify risky behavior in homeless youth (Naranbhai & Meyer-Weitz, 2011). Further research is needed that utilizes rigorous methodology in design, delivery, and outcome measurements.

Brief preventive interventions have increased adolescents' knowledge of HIV and encouraged positive attitudes toward safe sex and drug-related behavior (Johnson, Carey, Marsh, Levin, & Scott-Sheldon, 2003). However, these brief interventions, usually no more than two to three sessions, have not demonstrated significant behavior change in the long run (over a two year period). More intensive prevention programs that have successfully led to reductions in risk behaviors among homeless youths involve a minimum of 10 sessions and ongoing support for behavior change (Rotheram-Borus et al., 2003; Slesnick, Dashora, Letcher, Erdem, & Serovich, 2009; Slesnick & Kang, 2008). Although the more comprehensive programs have demonstrated effectiveness in reducing the frequencies of high risk acts among homeless youth who spend lengthy times in a shelter, many homeless youths are transient and not available to participate in lengthy interventions.

Many homeless youth are in dire need of risk reduction interventions. However, these youth often report negative experiences with police, case managers, facilitators, foster parents, and other adults who are in “helping” roles (Peterson, Baer, Wells, Ginzler, & Garrett, 2006; Rabinovitz, Desai, Schneir, & Clark, 2010). Homeless youth are often distrustful of adults offering assistance, and resistant to messages that appear to challenge their autonomy. However, the collaborative and reflective approach of Motivational Interviewing (MI) may be suitable for use with homeless youth (Altena, Brilleslijper-Kater, & Wolf, 2010; Baer, Peterson, & Wells, 2004; Baer, Garrett, Beadnell, Wells, & Peterson, 2007; Peterson et al., 2006; Slesnick et al., 2009).

### **Motivational Interviewing**

MI was created in 1983 by clinical psychologists Dr. William Miller and Dr. Stephen Rollnick. MI is a “directive, client-centered counseling style designed to elicit behavioral change by assisting clients to explore and resolve ambivalence” (Miller, 1983). MI combines a supportive and empathic counseling style (Rogers, 1951) and self-perception theory that people tend to become more committed after they hear their own arguments that support change (Bem, 1973). MI was designed for use with individuals suffering from alcohol additions (Miller, 1983), but is currently used across a range of behavioral domains, including substance use, smoking cessation,

weight loss, and adherence to treatment and follow-up (Barnett, Sussman, Smith, Rohrbach, & Spruijt-Metz, 2012; Burke, Arkowitz, & Menchola, 2003; Dunn, Deroo, & Rivara, 2001; Miller & Rose, 2009; Rubak, Sandbaek, Lauritzen, & Christensen, 2005). The four central principles of MI include “express empathy by using reflective listening to convey understanding of the client’s message; develop discrepancy between the client’s most deeply held values and current behavior; use reflections to mitigate resistance and avoid confrontation; and support self-efficacy by building confidence that change is possible” (Moyers & Rollnick, 2002).

During an MI session, the counselor uses open-ended questions and reflections to elicit behavior modifying language. This language is referred to as “change talk” (CT) and “counter change talk” (CCT). CT is client language that leans towards the targeted behavior of the intervention. CCT is client language that leans away from the targeted behavior of the intervention. Facilitators using motivational interviewing will utilize several collaborative techniques, such as open ended questions that allow the client to explore their goals, desires and beliefs and how their current behavior may be discrepant. This collaborative environment creates an atmosphere where the client’s ambivalence or reluctance to change is viewed as a normal part of the human experience rather than as pathology or defensiveness (Burke et al., 2003). The facilitator will then follow up with complex reflections to actively engage with the client by reflecting upon their statements in a meaningful way that shows they understand, empathize, and are non-judgmental (Moyers & Rollnick, 2002).

### **Motivational Interviewing Coding**

Studies to date have used highly technical, valid and reliable MI specific coding systems to examine both client and facilitator communication during a MI session (Glynn & Moyers, 2010; Moyers et al., 2007; Moyers, Martin, Catley, Harris, & Ahluwalia, 2003). The first coding system Motivational Interviewing Skills Code (MISC) 1.0 was developed in 1997 (Miller, 2000). The most common use of the MISC 1.0 was to document changes in facilitator competence before and after training in MI and evaluate the quality of MI intervention (Baer, Rosengren, et al., 2004; Miller & Mount, 2001; Moyers, Miller, & Hendrickson, 2005; Moyers, Martin,

Manuel, Hendrickson, & Miller, 2005; Moyers et al., 2003). MISC 1.0 consists of three components: global assessments, behavioral codes, and the facilitator talk time.

MISC 1.0 consisted of three complete reviews of the intervention session and was comprised of 31 behavioral codes. The time spent coding and training coders made this process evaluation tool inaccessible to many researchers and practitioners. The reported average time it took a coder to perform a three-pass review of a 20-minute segment of a session was upwards of 90–120 minutes (Moyers et al., 2003). In addition, a few studies have found some discrepancies between global ratings and behavioral codes (Baer, Rosengren, et al., 2004; Miller & Mount, 2001; Moyers, Martin, Manuel, Hendrickson, & Miller, 2005; Moyers, Miller, et al., 2005; Moyers et al., 2003).

For slightly over a decade, efforts have been directed towards improving the quality of MI coding. These include several revisions of the original coding system MISC, the creation of stand-alone coding systems that meet a specific research need and supplemental MI coding systems to reduce cost, improve validity, and expand application and functionality (Apodaca, Manuel, Moyers, & Amrhein, 2007; Glynn & Moyers, 2008; Martin, Moyers, Houck, Christopher, & Miller, 2005; McCrady et al., 2013; Miller, Moyers, Manuel, Christopher, & Amrhein, 2008; Miller, Moyers, Ernst, & Amrhein, 2003).

### **Group Level Motivational Interviewing**

MI is usually conducted in one-to-one sessions. However, in many service delivery settings (such as drop-in centers for homeless youth), staff time and other resources are too limited to be able to offer this type of individual counseling. An MI intervention delivered in a group setting is more feasible and thereby more likely to be sustainable in community-based settings. For this reason, there has been growing interest in delivering MI in group settings. The primary difference between group MI and individual MI interventions is the peer-to-peer interactions that occur during each session. During a group MI intervention, the counselor's goal is to elicit CT from each individual client, as well as to encourage positive/supportive responses from their peers while maintaining MI consistent behaviors. Thus, it is important to not only examine CT,

but to understand how behavioral dynamics during group MI affect behavioral outcomes for individual clients. A recent study found that positive peer responses to CT during a group level MI intervention for at-risk youth were associated with decreased alcohol intentions, expectancies, and use three months later (D'Amico et al., 2015).

Although many studies have examined how MI elicits CT and CCT during one-on-one exchanges between the counselor and client, there has been little work in the field of coding MI to identify coding mechanisms to examine client language in a group environment. Initial exploratory studies were able to examine client language within a group level setting by modifying MISC. D'Amico and colleagues found that more MI consistent behavior from the group facilitator increased the amount of CT in the group which, in turn, was associated with decreased alcohol intentions, expectancies, and use three months later (D'Amico et al., 2015). Shorey and colleagues were able to explore the frequencies of CT and relatedness, a new peer related construct. Results showed that both CT and relatedness occurred with greater frequency during the group MI session compared to the control treatment group (Shorey, Martino, Lamb, LaRowe, & Santa Ana, 2015). Engle and colleagues used a new commitment language coding system to analyze change and peer reinforcements by the creation of a new peer response construct. Correlational data showed that when youth expressed positive commitment language and peer response, teens had better marijuana use outcomes than those youth who had experienced negative peer response (Engle, Macgowan, Wagner, & Amrhein, 2010). This study was an important first step in trying to understand the adolescent group process when using MI; however, the exploratory study sample size was 19, which limited their power and their ability to find significant associations.

The aforementioned studies (D'Amico et al., 2015; Engle et al., 2010; Shorey et al., 2015) had promising results and were able to modify or create new coding systems to accommodate their research design. However, these studies are not easily replicable due to the lack of documentation of the revisions to the coding systems, parsing rules, coding rules, and training material/coding manual. Also, many of the coding mechanisms are labor intensive, designed for individual client sessions, and require extensive training. The extensive amount of resources needed to code MI sessions often result in little to no effect sizes, poorly fit models, and low

inter-rater reliability (Baer et al., 2008; Lane et al., 2005; Miller & Rollnick, 2002; Moyers, Martin, Manuel, & Miller, 2003; Owens, McCrady, Borders, Brovko, & Pearson, 2014). Therefore a new streamlined coding system was created for this study that was specifically designed as a cost-effective, reliable and easy to use tool for group level MI. In addition to the goals of the study, this study also explored the predictive quality of a streamlined parsing and coding method using the data collected from a pilot group-level Motivational Interviewing (MI) study.

## **Study Aims**

The current study sought to extend prior research on client language within MI sessions by examining the language of homeless youths through a group level MI intervention. In particular, this study uses MI group level data to explore the client language in a voluntary intervention (AWARE) delivered within drop-in center settings for unaccompanied homeless young adults. The 4-session group-based MI intervention focused on the youth's individual substance use and risky sexual practices by utilizing personalized feedback, role play exercises, and interactive protective strategy exercises.

The following are the aims of this study:

- To develop a streamlined method to parse and code client language during group-level MI sessions.
- Using this streamlined parsing and coding method, to examine how CT and CCT during a group-level MI intervention are related to changes in client attitudes, intentions, and behaviors over a three month time period. Hypothesis 1: Higher levels of CT during a group level MI will be associated with decreased substance use behaviors, increased condom use, and increased attitudes and intentions towards the targeted change behavior(s). Hypothesis 2: Higher levels of CCT during a group level MI will be associated with increased substance use behaviors, decreased condom use, and increased attitudes and intentions away from the targeted change behavior(s).

Only three studies to date (D'Amico et al., 2015; Engle et al., 2010; Shorey et al., 2015) have coded client language within a group-based MI setting to examine its association with client

outcomes. The present study is unique and adds to this small literature in three important respects: (1) it develops and utilizes a streamlined parsing and coding method that is more feasible to use in research and clinical settings; (2) it is the first study to examine how exposure to CT and CCT during a group-level MI intervention is related to client behavior change among homeless young adults, a highly vulnerable, yet understudied population; and (3) it is the first study to examine how exposure to CT and CCT is related to both substance use and sexual risk behavior outcomes, as the three previous studies of group-level MI have only focused on substance use outcomes.

### **Streamlined Parsing and Coding System**

The MI coding system that was developed for this study incorporated the use of computer software to help facilitate the parsing, coding, and global rating process, CASAA Application for Coding Treatment Interactions (CACTI). CACTI was designed as a comprehensive tool to analyze MI sessions with the use of wav audio files (Glynn, Hallgren, Houck, & Moyers, 2012). This functionality eliminates the need for costly transcriptions. Most elements of the interface are easily modified (xml file) and can be further adapted using Java through the terms of the GNU Public License. Coding with this software yields interrater reliabilities comparable to previous methods, but at greatly reduced time and expense (Barnett et al., 2014; Barnett, Spruijt-Metz, et al., 2012; D'Amico et al., 2015; Fischer, 2012; Moyers, Houck, Glynn, & Manuel, 2011).

### **MI Coding Training**

Prior to the development of the MI coding system, the researcher received training from an expert MI trainer and coder. Dr. Elizabeth Barnett provided training for the use of Motivational Interviewing Skill Code (MISC 2.5) (Houck, Moyers, Miller, Glynn, & Hallgren, 2010), MITI (Moyers, Martin, Manuel, & Miller, 2003), and Center for Alcoholism, Substance Abuse, and Addiction (CASAA) Application for Coding Treatment Interactions (CACTI; Glynn et al., 2012). Dr. Barnett is a motivational interviewing trainer and certified MISC/MITI coder. Training of the MISC 2.5 and CACTI was approximately 40 hours over a 10-week session and

included weekly coding practice exercises, extensive review of all of the facilitator and client codes, and assistance with modifying the individualized coding methods for group level coding. After initial training, coder meetings were held monthly to address progress, prevent coder drift, and to discuss sessions that were difficult to code. The trainer also coded several sessions to ensure accuracy and inter-rater reliability.

Obtaining suitable training was difficult, resulting in a repetitive process of mastery of MISC 2.5 and MITI coding methods with the use of four practice exercises. There is a need to expand the training material for coding application. The Center for Alcoholism, Substance Abuse, and Addiction (CASAA) at the University of New Mexico is the premier MI coding institution and although the Center provides MI classes year round, there is little to no coding training available to the public outside of MITI. There was no training material for the CACTI application, although the manual was comprehensive.

### **Components of Coding System**

After mastery of MI coding and an extensive review of the literature, a set of criteria was developed to help determine the desirable characteristics of the streamlined coding system. The definitions of the criteria are detailed below:

- **Ease of Use:** The criterion refers to the quality of the instructional procedures and level of difficulty to comprehend the components of the coding system.
- **Reliable:** The criterion refers to the ability of multiple coders to be able to replicate the entire coding process with a high degree of inter-rater reliability.
- **Cost:** The criterion refers to the total cost of the resources needed to complete the full coding process.
- **Coding Time:** The criterion refers to the total length of time that it takes to complete the full coding process.
- **Training:** The number of hours it takes to train a novice level coder to meet the minimum threshold training suggested for a proficient coder. Training may include instructional time, practice exercises, and competence testing.
- **Research Application:** Capabilities to effectively access client(s) and/or facilitator(s) language during a MI session.

- Facilitator Support: Capabilities of providing treatment integrity measures (including the capability to provide detailed session feedback for counselors in the process of learning MI, including specific goals for improved skillfulness).

Next a list of components was created to evaluate each of the aforementioned criteria. The definitions of the components are detailed below:

- CT/CCT: This component collapses all client and language either towards the targeted change behavior (CT) or away from the targeted change behavior (CCT) into two umbrella codes.
- CT/CCT sub codes: This component includes all client language, typically includes both positive and negative forms of desire, ability, reasons, need for change, and commitment language (Amrhein, Miller, Yahne, Palmer, & Fulcher, 2003).
- Facilitator Behaviors: This component includes the ability to measure the adherence and competence of facilitators employing this treatment.
- Sequential Coding: This component permits the coder to record each facilitator and client behavior in a consecutive order.
- Frequency: This component permits the coder to tally all of the facilitator and/or client behavior codes.
- Whole Session: The component requires that the entire session is coded.
- Partial Session: The component requires that a specific segment of the session is coded. Typically either the first or last 20 minutes of the session is coded using this method.
- Global scores: This component rates the overall spirit and intention of the MI session using a Likert scale. Ratings are based on the overall behaviors throughout the session.
- Transcript Needed: The use of a transcript is needed to code each session.
- Audio: The use of audio is needed to code each session, therefore no transcripts are required.

A decision matrix was created (Table 1) by listing the criteria (columns) and MI components (rows) to systematically identify, analyze, and rate the relationships between the criteria and MI components. The matrix is useful for assessing each factor's relative significance and can ultimately be used to determine the prioritized components of the new MI group level coding system.

**Table 1:** Decision Matrix for Development of the Group Level MI Coding System

	<b>Ease of Use</b>	<b>Cost</b>	<b>Coding Time</b>	<b>Training</b>	<b>Research Application</b>	<b>Facilitator Support</b>
<b>CT/CCT</b>	<b>High</b>	<b>Low</b>	<b>Decreased</b>	<b>Decreased</b>	<b>Medium</b>	<b>No</b>
<b>CT/CCT sub codes</b>	<b>Low</b>	<b>High</b>	<b>Increased</b>	<b>Increased</b>	<b>High</b>	<b>No</b>
<b>Facilitator Behaviors</b>	<b>Low</b>	<b>High</b>	<b>Increased</b>	<b>Increased</b>	<b>Medium</b>	<b>Yes</b>
<b>Sequential Coding</b>	<b>Low</b>	<b>High</b>	<b>Increased</b>	<b>N/A</b>	<b>High</b>	<b>N/A</b>
<b>Frequency</b>	<b>High</b>	<b>Low</b>	<b>Decreased</b>	<b>N/A</b>	<b>Medium/Low</b>	<b>N/A</b>
<b>Whole Session</b>	<b>Low</b>	<b>High</b>	<b>Increased</b>	<b>N/A</b>	<b>Medium</b>	<b>N/A</b>
<b>Partial Session</b>	<b>High</b>	<b>Low</b>	<b>Decreased</b>	<b>N/A</b>	<b>Medium</b>	<b>N/A</b>
<b>Global scores</b>	<b>Medium</b>	<b>Medium</b>	<b>N/A</b>	<b>N/A</b>	<b>High</b>	<b>High</b>
<b>Transcript Needed</b>	<b>High</b>	<b>High</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>
<b>Audio</b>	<b>Medium</b>	<b>Low</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>

Legend: Ease of Use: High – Relatively Easy to Use to Low – Difficult to Use.

Cost: High Cost – Expensive system and requires a lot of resources to Low Cost - Relatively inexpensive system.

Coding Time: Increased Time – Requires more time to code to Decreased time – Requires less time to code.

Training: Increased Training – Requires more time and resources to train coders to Decreased Training – Requires less time and resources to train coders.

Research Application: High, Medium or Low capabilities to effectively access client(s) and/or facilitator(s) language during a MI session.

Facilitator Support: Capable of providing treatment integrity measures (yes/no).

The ideal coding system would consist of all of the desired characteristics; however, tradeoffs are needed to ensure that the coding system is a feasible and replicable tool. For example, the CT/CCT component is relatively easy to use and cost effective but may not have predictive utility due to the amount of information that is missed due to collapsing codes. The CT/CCT sub codes component may be costly and difficult to replicate, but it has the potential to provide a high value to researchers in terms of predictive capabilities.

The coding system was designed to balance all of the criteria with MI components to create a system that is reliable, cost effective and has the predictive qualities to examine how CT and CCT during group MI are related to individual client outcomes.

## MI Coding Parsing and Coding System

A streamlined parsing technique was used to separate the facilitator volleys from the client(s) volleys. Unique utterances within the facilitator and client volleys were grouped into clusters instead of parsing each utterance separately. Unique utterances are defined as being distinguishable from the previously coded utterance within the volley. A volley is a series of utterances spoken by the facilitator or a client. For example, when the facilitator is presenting the instructional material, and a client interrupts with a change talk comment, the two volleys are parsed and coded separately. An additional modification to MISC 2.5 parsing included the treatment of multiple clients speaking simultaneously during the session. These utterances were parsed according to their unique utterances. For example, when two or more clients responded to the facilitator, the series of utterances is defined as a “client only” volley. The “client only” volley grouped into clusters of unique utterances instead of parsing each utterance separately.

Components of MISC 2.5 were used to code client change talk and sustain talk. The parsed audio sessions were coded using a modified version of CASAA Application for Coding Treatment Interactions (CACTI) open-source software. The client(s) use of MISC 2.5 codes (Desire, Ability, Reason, Need, Commit, Taking Steps, and Other) was coded as change talk if the client’s utterance was directed towards the targeted change behavior. The client(s) use of MISC 2.5 codes (Desire, Ability, Reason, Need, Commit, Taking Steps, and Other) was coded as CCT if the client’s utterance was directed away from the targeted change behavior.

Two peer response codes were constructed to capture the observable, in-session peer interactions within a group level intervention MI session. The peer response towards the targeted change behavior code was used to code a non-change talk utterance following a unique utterance of CT (or CCT) that was directed towards the targeted changed behavior. For example, after a client responded with a unique utterance of CT (“I always wear condoms”), another client responds with an affirmation towards targeted change behavior (“Good for you!”). The peer response away from targeted change behavior code was used to code a non-change talk utterance following a unique utterance of CT (or CCT) that was directed away from the targeted changed

behavior. For example, after a client responded with a unique utterance of CT (“I always wear condoms”), another client responds with a derogatory statement (“That sucks!”).

The streamlined coding system was designed to be reliable, efficient, and relevant for research and clinical purposes. However, revising an instrument has its disadvantages and researchers will need to demonstrate reliability and validity. The current analyses sought to extend prior studies of client language within MI sessions by modifying the coding process to examining the language of homeless youth through a group level MI intervention.

The results of this study should be of interest to policymakers, researchers and practitioners who are seeking to expand the evidence-based literature for health-related risk reduction interventions targeting homeless youth. If effective and widely utilized, the proposed streamlined MI coding process would greatly decrease the amount of resources needed to examine the effects of non-judgmental, collaborative, evidence-based group MI interventions, similar to the pilot intervention examined in this study.

## **Chapter 2: Coding**

Studies to date that have coded client and facilitator responses during a MI session have used a variety of instruments to evaluate the integrity of the MI treatment, competence of the facilitator, and the predictive qualities of facilitator and client language. This chapter provides a detailed summary of the coding tools used since the inception of MI.

### **Motivational Interviewing Skills Code**

The first coding system specifically designed to evaluate the counselor and client dynamics within MI sessions was Motivational Interviewing Skills Code (MISC). The original coding system was developed in 1997 and designed for use with audiotapes and videotapes of individual counseling sessions (Miller, 2000). The most common use of the MISC 1.0 was to document changes in facilitator competence before and after training in MI and evaluate the quality of MI intervention (Baer, Rosengren, et al., 2004; Miller & Mount, 2001; Moyers, Miller, et al., 2005; Moyers et al., 2005; Moyers et al., 2003). MISC 1.0 consists of three components (global assessments, behavioral codes, and the facilitator talk time) that are completed separately in each review or “pass” of the session. A pass is a complete review of the full session. MISC 1.0 requires three full passes of the audio recorded session.

The first pass of the session is primarily for the coder to gain familiarity with the session content and assess the overall quality of the MI session based on a composite of global assessment scores (for the facilitator and client). The global characteristics are listed on a single sheet, and each characteristic receives a rating. Global assessments rate the overall spirit and intention of the MI session using a seven-point Likert scale. Only one whole number is given to each global assessment. Ratings are based on the overall behaviors throughout the entire session.

The facilitator is rated using six global characteristics (Acceptance, Egalitarianism, Empathy, Genuineness, Warmth and Overall MI Spirit). Brief descriptions of each facilitator’s global characteristic rating are detailed below:

- Acceptance: Facilitator’s ability to communicate acceptance and respect to the client (i.e. lacking judgmental, harsh, disrespectful, labeling, or condescending language).

- Egalitarianism: Facilitator's ability to emphasize with the client's personal autonomy, choice, and responsibility.
- Empathy: Facilitator's ability to understand the client's perspective through high-quality reflective listening skills such as using complex and simple reflections to reflect their understanding back to the client.
- Genuineness: Facilitator's ability to be perceived as open, responsive, and honest throughout the entire session.
- Warmth: Facilitator's ability to be perceived as warm, friendly, engaged, compassionate, helpful, and concerned.
- Overall MI Spirit: Facilitator's ability to capture the fundamental spirit of motivational interviewing skills and techniques. The facilitator has a collaborative, client-centered style of coaching and negotiating.

The client is rated using four global characteristics (Affect, Cooperation, Disclosure and Engagement). The interaction between the facilitator and client is rated using two global scores (Benefit and Collaboration). Brief descriptions of each client's global characteristic rating are provided below:

- Affect: Client's response to the intervention is emotional (positive and/or negative verbal communication).
- Cooperation: Client's ability to acquiesce to the flow/direction of the intervention.
- Disclosure: The level at which the client reveals significant information about himself or herself during the intervention.
- Engagement: Client's level of participating in the intervention (i.e. thinking, reflecting, experiencing, processing, or discovering their past and/or current behaviors).
- Benefit: The level at which the facilitator and client work collaboratively throughout the intervention.
- Collaboration: The extent to which the client shows forward movement toward the targeted behavior change.

In a second coding pass, the session is coded based upon separate utterances within each volley. An utterance is one complete thought spoken by an individual (facilitator or client). A volley is

an uninterrupted utterance or sequence of utterances by one individual. Each utterance is classified into either facilitator or client behavioral codes with the use of tally sheets (separate client and facilitator sheets containing a list of all codes for each type respectfully). The tally sheets are placed next to each other and coded simultaneously throughout the second pass. The coder codes each utterance into one of the coded categories.

The facilitator behavior is coded using 27 unique codes. Brief descriptions of each code are provided below:

- Advise With Permission: The facilitator gives advice, makes a suggestion, offers possible alternative strategies for obtaining permission from the client.
- Advise Without Permission: The facilitator gives advice, makes a suggestion, offers a solution or possible alternative strategies without seeking permission to advise the client.
- Affirm: The facilitator says an affirmative statement to the client.
  - Sub-categories include:
    - Appreciation: The facilitator comments favorably on an attribute or strength of the client.
    - Confidence: The facilitator makes a remark supports client's ability to accomplish a task, goal, or change a behavioral trait.
    - Reinforcement. The facilitator encourages the client's behavior in a way that does not directly comment on a client's nature and do not speak directly to self-efficacy.
- Confront: The facilitator directly disagrees, argues, criticizes, judges, or questions the client's honesty and/or past experiences.
- Direct: The facilitator gives an authoritative order or command to the client.
- Emphasize Control: The facilitator recognizes or emphasizes the client's freedom of choice and/or autonomy.
- Facilitate: Simple statements spoken by the facilitator that functions to the keep the session moving forward.
- Filler: A response from the facilitator that does not fit into any other code.
- Inform: The facilitator gives information, explains something, or provides feedback to the client.

Sub-categories include:

- Personal Feedback: Information about the client that was not readily available to the client (i.e. medical records, judicial information, and information from family members).
- Self-Disclosure: The facilitator gives personal information about their selves to the client.
- General Information: Other information that is not about the client or the facilitator.
- Question: The facilitator asks a question in order to gather information, understand, or elicit the client's past experiences and behavior.
  - Closed Question: The question implies a short answer, often resulting in a yes/no response.
  - Open Question: The question that provides an opportunity for a comprehensive response.
- Raise Concern With Permission: The facilitator points out a possible problem with a client's goal, plan, or intention with permission.
- Raise Concern Without Permission: The facilitator points out a possible problem with a client's goal, plan, or intention without obtaining permission.
- Reflect: The facilitator makes a statement that reflects back content or meaning previously spoken by the client, usually in the client's immediately preceding utterance.
  - Repeat: These reflections add nothing at all to what the client has said, but simply repeat or restate it using some or all of the same words.
  - Rephrase: These reflections stay close to what the client has said, but slightly rephrase it, usually by substituting a synonym. It is the same thing said by the client, but in a slightly different way.
  - Paraphrase: These reflections change or add to what the client has said in a significant way, to infer the client's meaning. The facilitator is saying something that the client has not yet stated directly.
    - Amplified Reflection: The facilitator exaggerates, increases in intensity, overstates, or otherwise reflects in a manner that amplifies the content offered by the client.

- Double-Sided Reflection: The facilitator includes both sides of ambivalence in a single reflective response.
  - Continuing the Paragraph: The facilitator anticipates the next statement that has not yet been expressed by the client.
- Summarize: These reflections gather together at least two different client utterances, at least one of which was not contained in the immediately preceding client statement.
- Reframe: The facilitator suggests a different meaning for an experience expressed by the client, placing it in a new light. These generally have the quality of changing the emotional valence of meaning from negative to positive (e.g., reframing nagging as caring), or from positive to negative (reframing "being able to hold your liquor" as a risk factor).
- Support: These are generally supportive, understanding comments that are not codable as Affirm or Reflect. They have the quality of commenting on a situation, or of agreeing or siding with the client.
- Structure: These are comments made to explain what is going to happen in the session, to make a transition from one part of a session to another, to help the client anticipate what will occur in the intervention.
- Warn: The facilitator provides a warning or threat, implying negative consequences that will follow unless the client takes certain action. It may be a threat that the facilitator has the perceived power to carry out (e.g., imposing negative consequences), or simply the prediction of a bad outcome if the client takes a certain course.

In the second coding pass, the client behavior is coded using four unique codes. Brief descriptions of each code are provided below:

- Change Talk: The client makes a statement that directly or indirectly shows evidence of moving forward in the direction of change in the target behavior.
- Counter Change Talk: The client makes a statement that directly or indirectly shows evidence of moving forward in the direction of change in the target behavior.
- Follow/Neutral: The client's response follows along but is neither Resist Change (moving away from change) nor Change Talk (moving toward change).

- Ask Question: The client requests information, asks a question, seeks the facilitator's advice or opinion.

After the second pass, all of the tallies in each category are totaled in each category for both the facilitator and client language. In the third pass, the total amount of time that the facilitator and client are talking during the session is recorded.

After all three passes are complete, a summary of scores are computed to determine the quality of the MI session. The summary scores include the following:

- The Ratio of Reflections to Questions: The number of reflect (Repeat, Rephrase, Paraphrase and Summarize) responses divided by the total number of questions (Open and Closed).
- Percent Open Questions: The number of open question divided by the number of questions (Open and Closed).
- Percent Complex Reflections: The number of paraphrases and summarize reflections divided by the total number of reflections (Repeat, Rephrase, Paraphrase and Summarize).
- MI Consistent Responses: The total number of MI consistent language (Advise with permission, Affirm, Emphasize Control, Open Question, Reflect (Repeat, Rephrase, Paraphrase and Summarize), Reframe and Support).
- MI Inconsistent Responses: The total number of MI inconsistent language (Advise without permission, Confront, Direct, Raise Concern without permission, Warn).
- Percent MI Consistent Responses: The number of MI consistent responses divided by the number of all MI responses (MI consistent and MI inconsistent responses).
- Percent of Facilitator Talk Time: The total amount of facilitator talk time divided by total client and facilitator talk time.
- Rates of Facilitator Response: The numbers of reflections (Repeat, Rephrase, Paraphrase and Summarize) divided by the total talk time (Client and Facilitator talk time).
- Percentages Client Change Talk: The number of client change talk divided by the total number of client change talk and sustain talk.

MISC 1.0 includes targeted thresholds (Table 2) for proficient and expert level MI facilitator.

**Table 2:** MISC 1.0 Facilitator Thresholds

<b>Behavioral Indicator</b>	<b>Expert Level MI</b>	<b>Proficient Level MI</b>
<b>Global Facilitator Ratings</b>	> 6.0	> 5.0
<b>Reflections to Questions Ratio</b>	> 2.0	> 1.0
<b>Percent Open Questions</b>	> 70%	> 50%
<b>Percent Complex Reflections</b>	> 50 %	> 40%
<b>Rate of Reflections per 10/min</b>	> 15	> 10
<b>Percent MI Consistent</b>	> 90%	> 80%
<b>Percent Facilitator Talk Time</b>	< 50%	< 60%

MISC 1.0 was used primarily to test whether the facilitator was able to achieve the recommended thresholds following an initial MI training and sustain it for months following the initial training. Studies have shown that facilitators tend to increase MI adherence immediately following training and slowly (after four months) decline to their pre-training adherence levels (Miller, Yahne, Moyers, Martinez, & Pirritano, 2004).

MISC 1.0 consisted of three passes and over 31 behavioral codes. The time spent coding and training coders made this process evaluation tool inaccessible to many researchers and practitioners. The reported average time it took to train one coder to reliably code one session was three months. The reported average time it took a coder to perform a three-pass review of a 20-minute segment of a session was upwards of 90–120 minutes (Moyers et al., 2003). In addition, a few studies have found some discrepancies between global ratings and behavioral counts (Baer, Rosengren, et al., 2004; Miller & Mount, 2001; Moyers, Martin, et al., 2005; Moyers, Miller, et al., 2005; Moyers et al., 2003).

Feedback of MISC 1.0 users stated that the lengthy three-pass process threatens to reduce rater reliability, but that it is difficult to eliminate one or more passes without losing essential components that are used to measure the overall strength of the MI session (Lane et al., 2005). In addition, mean levels of client CT consistently failed to predict behavior change (Baer et al., 2008; Miller & Rollnick, 2002).

## **MISC Version 2.0**

After years of testing the validity, ease of use, and effectiveness of MISC 1.0, researchers modified MISC 1.0 to reduce redundant or unreliable behavioral codes and to eliminate any processes that were not essential to examining the effectiveness of MI interventions and relevant to training and clinical practice (Miller, Moyers, Ernst, & Amrhein, 2003). MISC 2.0 eliminated the third pass for timing of relative counselor and client talk time because the third pass was not cost effective, yielded relatively little information and did not add to the predictive utility of MISC 1.0.

The first pass of the session is primarily for the coder to gain familiarity with the session content and assess the overall quality of the MI session based on a composite of global assessment scores (for the facilitator and client). Similar to MISC 1.0, the global characteristics in MISC 2.0 are listed on a single sheet, and each characteristic received a rating. Global assessments rate the overall spirit and intention of the MI session using a seven-point Likert scale. Only one whole number is given to each global assessment. Ratings are based on the overall behaviors throughout the entire session. Three global dimensions were eliminated (Egalitarianism, Genuineness, and Warmth), while Acceptance, Empathy, and Spirit were retained based on their reliability. A client based global rating was added named Self-Exploration. Self-exploration global rating is defined by the client's ability to engage actively with their interpersonal feelings, values, fears, and perceptions. The global rating is not based on the full intervention session; it only reflects the client's highest level of self-exploration during the session.

The second phase of MISC 1.0 was modified extensively, including partial session coding, the advent of sequential coding, and the elimination of 9 facilitator behavioral codes. Consistent

with goals to increase cost-effectiveness and decrease time constraint, only the first 20 minutes of each session is coded in MISC 2.0. However, the inclusion of sequential coding may increase the level of difficulty. Sequential coding is the process of recording all codes in order of occurrence rather than tallied. Sequential coding was found to increase the predictive quality of CT within an MI session (Amrhein et al., 2003).

Significant revisions to the behavioral codes occurred in MISC 2.0 including the elimination of the affirm sub codes (Appreciation, Confidence, and Reinforcement), replacing the giving information sub code as the primary “inform” code, deleting the remaining inform sub codes (Personal Feedback and Self-Disclosure), and merging the four reflect sub codes into two new reflect categories (Simple Reflection and Complex Reflection). Simple Reflections are defined as the addition of little or no meaning or emphases to the client’s statement, merely an utterance to convey basic understanding of the client’s utterance. Conversely, complex reflections are substantial and meaningful contributions that convey a deeper or richer picture of the client’s statement.

The client codes were extensively modified in MISC 2.0. CT and CCT were expanded to include six unique client sub codes (Desire, Action, Reason, Need, Taking Steps and Other). These new codes were constructed with the use of linguistic markers and 12-item Change Questionnaire (Amrhein et al., 2003). Each new code was given a strength score ranging from +5 (strong inclination toward the targeted change behavior) to -5 (strong inclination away from the targeted change behavior) to judge the numeric strength of the client’s utterance. The intensity of inclination can be increased or decreased by signals in the content, vocal tone, or context of an utterance.

The following are brief descriptions of each new MISC 2.0 client code:

- Ability: Statements that indicate personal perceptions of capability or the possibility of change.
- Commitment to change: Statement that imply an agreement, intention, or obligation regarding future targeted behavior changes.
- Desire: Statements that indicate a wanting, wishing, willing or a general level of desire.

- Need: Statements that indicate a necessity, urgency, or requirement (for change or non-change).
- Reasons: Statements that specify a particular rationale, basis, incentive, justification, or motive for obtaining (or not obtaining) the targeted change behavior.
- Taking Steps: Statements that describe a particular action that the person has recently done or plans to do that are moving towards (or away from) the targeted behavior change.

MISC 2.0 does not include information pertaining to summary scores or facilitator MI thresholds.

### **MISC Version 2.1**

Critiques of MISC 2.0 focused on the low inter-rater reliability due to the number of behavioral codes and strength scores (-5 to +5). MISC 2.1 was modified to address this concern by separated the second pass into separate passes (one pass for the facilitator’s behavior codes and one pass for the client behavior codes). The first pass is consistent with MISC 1.0 and MISC 2.0; the first pass is for global ratings. There were no modifications to the first pass in MISC 2.1.

The second pass is similar to MISC 2.0 with the addition of coding the entire session and to only code the client behavior. Sequential ordering is not required in MISC 2.1. A tally sheet may be used to count each behavioral count.

The third pass of MISC 2.1 focuses exclusively on client language. Revisions include revising the strength codes from a mandatory numeric (-5 to 5 scoring) system to an optional categorical (low, medium, high) system. The direction of the client language is still needed to differentiate change talk from sustain talk. Client behavior categories desire, ability and need were recoded to become sub codes under reason. The ask code is now regrouped with the follow/neutral code. Lastly, a new code “Other” was added that is defined as a statement that reflects any change talk that does not fall into the reason category.

MISC 2.1 summary scores are similar to MISC 1.0. All of the summary scores are the similar to the scores in MISC 1.0 with the exception of the deletion of all scores that required timed values (client and facilitator talk time). Also, the reflect category is now simple and complex

reflections (instead of Repeat, Rephrase, Paraphrase and Summarize). MISC 2.1 does not include information pertaining to facilitator MI thresholds.

### **Motivational Interviewing Sequential Code for Observing Process Exchanges**

Sequential Code for Observing Process Exchanges (SCOPE) was developed after MISC 2.1 for the purpose of sequential coding of both facilitator and client behaviors (Martin et al., 2005). SCOPE has two full passes of the transcribed session (audio can also be used to assist the coding process). The first pass of the session is primarily for the coder to gain familiarity with the session content and parse each utterance of the session. Each parsed utterance is numbered, generally in the space above the printed line. During the second pass of the session, the appropriate behavior is written next to the coded utterance.

SCOPE facilitator and behavioral client codes are comparable to MISC 1.0 and MISC 2.0. Many of the behavioral codes are the similar, with the addition of three facilitator codes (Filler, Permission Seeking, and Opinion) and one client code (Ask).

The following are definition of the new SCOPE behavioral codes:

- Filler: This is a code for the few responses not codeable elsewhere such as pleasantries.
- Permission Seeking: The facilitator requests permission from the client to speak.
- Opinion: The facilitator provides information in a subjective fashion (persuasive or supportive).
- Ask: The client requests information (asks a question, seeks the facilitator's advice or opinion).

In addition to the categories described above, each utterance may be classified into one of three mutually exclusive categories [(plus (+), minus (-), and neutral (0)]. This allows the coder to convey which direction the utterance is toward. After the coding pass is completed, it is recommended that the codes are collapsed to ensure that the analysis yields statistical results to avoid statistical concerns about parameter estimation and standard error bias (Dixon & Massey, 1969). SCOPE developers recommend collapsing all CT and CCT into two separate categories,

along with a follow/neutral/ask category for the client behaviors. Then facilitator's behaviors are recommended to collapse in five facilitator speech categories (Question, Reflect, MI-consistent, MI-inconsistent, Reflections, and Other).

SCOPE uses MISC 2.1 summary scores to determine the quality of the MI session. Studies show that SCOPE is a valid instrument to explore facilitator and client relationships. While examining temporal relationships, when facilitators used MI-consistent behaviors, there was an immediate increase in the probability of CT ( $p < .01$ ). Similarly, when facilitators used MI-inconsistent behaviors, there was an immediate increase in the probability of CCT ( $p < .01$ ) (Moyers & Martin, 2006). This evidence supports the use of MI fidelity training and evaluation methods to increase client outcomes and overall MI effectiveness.

SCOPE is an extensive MI coding system that requires over 100 hours of instruction for new coders and approximately 50 hours of coding instruction to experienced coders. The additional cost of training, transcripts, and parsing/coding labor makes SCOPE infeasible for many researchers.

### **MISC Version 2.5**

MISC 2.5 incorporates features from the MISC 2.1 and (SCOPE) to capture more accurately the subtleties of facilitator and client language. Changes made from the MISC 2.1 include the addition of a new global rating (Direction), the conversion from a 7-point Likert- rating scale to a 5-point Likert scale for all global measures, and the elimination of strength ratings (Low, Medium, and High) from client behavior codes. Changes made from SCOPE include collapsing the Permission-Seeking category into Emphasize Control and the inclusion of additional examples to further explain behavioral codes that were often miscoded (Houck et al., 2010).

Coding for MISC 2.5 is performed in three separate passes. In the first pass, a coder listens to the entire recording and assigns a number to each global rating. In the second pass, the recording is parsed into utterances. In the third pass, the coder applies behavioral codes to each facilitator

and client parsed utterance (in sequential order). MISC 2.5 uses MISC 2.1 summary scores to determine the quality of the MI session.

MISC 2.5, is one of first MI coding systems to be used with the specifically designed MI coding software CASAA Application for Coding Treatment Interactions (CACTI). CACTI was designed as a comprehensive tool to analyze MI sessions with the use of wav audio files (Glynn et al., 2012). This function eliminates the need for costly transcriptions. Most elements of the interface are easily modified (xml file) and can be further adapted using Java through the terms of the GNU Public License. The use of CACTI along with MISC 2.5 in various studies yielded significant effects, but at greatly reduced time and expense (Barnett et al., 2014; Barnett, Spruijt-Metz, et al., 2012; D'Amico et al., 2015; Fischer, 2012; Moyers et al., 2011).

### **Client Language Easy Rating**

Client Language Easy Rating (CLEAR) was designed to classify and quantify the client's CT and CCT during an MI session. CLEAR is a modification from MISC 1.0 and focuses only on the client communication (Glynn & Moyers, 2008). CLEAR was the first MI coding system to categorize CT and CCT. Similar to MISC 2.1, the CT and CCT categories include desire, ability, reason, need, and other. Although the client language is categorized into unique codes, only CT and CCT are coded. The neutral client language code remained the same as MISC 1.0. Therefore, only CT, CCT, and neutral client language and all facilitator language are ignored. Training for a novice coder to be able to reliably code CLEAR is estimated at 5 instructional hours.

The benefits of CLEAR are its simplicity, relative ease of training, and lack of transcription required. Another benefit is CLEAR coders are able to calculate the percentage of CT (or CCT) as a primary outcome variable (similar to MISC 1.0). Research applications of CLEAR predictive qualities were demonstrated when it was used to determine whether facilitators could evoke CT. Facilitators were able to evoke more CT with the use of MI techniques ( $p < .001$ ) than the use of functional analysis (Glynn & Moyers, 2010).

## **Motivational Interviewing Treatment Integrity 2.0**

Motivational Interviewing Treatment Integrity (MITI) 2.0 was designed as a cost effective alternative to MISC 1.0, to assess only the quality of the motivational interviewing session with the use of global scores and behavioral counts. When the application of the MISC is prohibitive in terms of time, money, personnel or some combination of these, the MITI is a reliable, sensitive and informative alternative that requires fewer resources to apply.

MITI has been used primarily for training applications for the MI facilitators including assessment of the facilitator ability to effectively utilize MI techniques, individualized level feedback to improve MI consistent facilitator responses, differentiation between pre- and post-training samples and self-evaluation by comparing global ratings with the recommended thresholds in the MITI coding manual (Moyers et al., 2003). Prior to using MISC 1.0 to evaluate a facilitator's adherence to motivational interviewing techniques, checklists were used to monitor MI consistent in MI and inconsistent facilitator speech (Moyers et al., 2005). Usually, there is minimal training required to use a checklist. However, MITI training is extensive consisting of approximately forty hours of instructional training, practice coding sessions and quizzes.

MITI 2.0 consists of two passes of a randomly selected 20-minute segment of the audio recorded session. Sampling of the tape segments is recommended to be random to ensure proper inferences about the overall integrity of the MI intervention (Moyers et al., 2003). The first pass consists of assigning global score ratings to the session. The global score scores (Empathy and MI Spirit) were similar to MISC 2.0; however the acceptance and self-exploration score were eliminated. The second pass required the coder to tally seven facilitator behaviors. The behavior codes are slightly broader categories of previous facilitator behavior codes. The following is a list of the facilitator behavior codes for MITI:

- Giving Information
- MI Consistent (Asking permission, Affirm, Emphasize Control, Support)
- MI Non-Consistent (Advise, Confront, Direct)
- Open Question
- Closed Question

- Simple Reflections
- Complex Reflections

The facilitator behaviors are tallied on one sheet. After the second pass is complete, the tallies are totaled and used to create summary scores. A partial list of summary scores were listed in MITI 2.0 and they were similar to those listed in MISC 2.1 and included the percentage of complex reflections, percentage of open questions, the ratio of reflections to questions, and the percentage of MI consistent.

MITI 2.0 included targeted thresholds (Table 3) for beginner and expert level MI facilitator.

**Table 3:** MITI 2.0 Facilitator Thresholds

<b>Behavioral Indicator</b>	<b>Beginner Level MI</b>	<b>Competent Level MI</b>
<b>Global Facilitator Ratings</b>	5	6
<b>Reflections to Questions Ratio</b>	1	2
<b>Percent Open Questions</b>	50 %	70 %
<b>Percent Complex Reflections</b>	40 %	50 %
<b>Percent MI Consistent</b>	90 %	100%

Potential training applications for the MITI 2.0 include self-evaluations by facilitators learning MI, assessment of the effectiveness of teaching strategies for MI, and individualized feedback to facilitators to improve MI competence. Potential research applications include evaluation of treatment integrity in clinical trials using MI (Moyers et al., 2005). Studies show that when facilitators were placed into different MI training groups (workshop only, workshop plus feedback, workshop plus coaching, workshop plus feedback and coaching and the self-training control group), only the workshop plus feedback and coaching group showed significantly better client responses compared with baseline ( $p < .01$ ). These results indicate that MITI can effectively detect changes in facilitator behaviors over time (Miller et al., 2004).

### **MITI Version 3.0**

Motivational Interviewing Treatment Integrity (MITI) 3.0 has similar uses as MITI 2.0, but with a few revisions. MITI 3.0 consists of one pass of a randomly selected 20-minute segment of the audio recorded session that includes global ratings and behavioral facilitator counts. The first pass of the session is for the coder to assign global rating scores and tally the facilitator codes. The merge of the two passes reduces the time it takes for the coder to complete the coding process which reduces cost and increases efficiency. Similar to MITI 2.0, the global characteristics are listed on a single sheet, and each characteristic receives a rating. Global assessments rate the overall spirit and intention of the MI session using a five-point Likert scale. The 5- point scale is reduced from the 7-point scale in MITI 2.0. Only one whole number is given to each global assessment. Ratings are based on the overall behaviors throughout the entire session. MITI 2.0 global scores (Empathy and MI Spirit) varied greatly from MITI 3.0 global scores; one score from MISC 2.0 was included (Evocation), while Collaboration, Autonomy/Support, and Direction were added as new global scores.

The following is a list of the new global ratings along with definitions:

- Evocation: The facilitator's ability to focus their efforts to elicit change talk from the client.
- Collaboration: The facilitator's ability to behave in a collaborative manner with the client.
- Autonomy/Support: The facilitator's ability to support the client's perception of choice.
- Direction: The facilitator's ability to maintain an appropriate focus on a specific target behavior change or concerns directly tied to it.

The behavior codes in MITI 3.0 are similar to the behavior codes in MITI 3.0, there no revisions to behavior codes in the MITI 3.0 coding system. The global ratings and facilitator behaviors are tallied on one sheet. After the pass is complete, the tallies are totaled and used to create summary scores. A partial list of summary scores was listed in MITI 3.0, and they were similar to those listed in MITI 2.0, with the exception of the addition of global spirit rating. The global spirit rating is formulated by totaling the Evocation, Collaboration, and Autonomy/Support scores and dividing by 3. MITI 3.0 included targeted thresholds for beginner and expert level MI

facilitator, similar to MITI 2.0 with the exception of lowering the global facilitator ratings for the beginner level and competent level to 3.5 and 4 respectively. The decrease in the facilitator's ratings allows for expert level MI facilitator status to be achieved. The inability to measure advanced skills in the use of MITI 3.0 is a limitation. For example, MITI 3.0 is not able to capture subtleties such as the use of micro skills (such as using complex reflections to elicit change talk rather a closed question) (Moyers, Martin, Manuel, Miller, & Ernst, 2007).

MITI subsequent versions (MITI 3.1, MITI 4.1 and MITI 4.2) resemble MITI 3.0 with the exception of revisions in the text which describe the codes in greater detail. Due to the similarity of the coding manuals, the subsequent versions of MITI will not be explained in this chapter.

### **Client Language Assessment in Motivational Interviewing (CLAMI)**

Client Language Assessment in Motivational Interviewing (CLAMI) was developed after MISC 2.0, to access client language within an MI session. CLAMI is oftentimes used in combination with MITI (to examine the MI fidelity of the session). CLAMI has two full passes of the transcribed session (audio can also be used to assist the coding process). The entire session is parsed, and a code is assigned to each client utterance.

During the first phase of CLAMI, the transcripts are parsed to separate all client utterances from the facilitator's utterances. For the second pass, only client parsed utterances are given a behavioral code. Similar to MISC 2.1, the reason is an overarching category of desire, ability and need. The coder may code using the reason code or the sub codes (if needed). Additional codes include other and follow/neutral/ask to depict client outside of the realm of CT and CCT. Each code is followed by a positive (+) or negative (-), representing the direction of the client language, towards (or away from) the targeted change behavior. Strength ratings for CLAMI coding system were assigned high, medium, and low values. However due to coder IRR, the strength ratings are optional. CLAMI coding system does not provide a list of summary scores or targeted thresholds for MI facilitators (Miller et al., 2008).

Studies using the CLAMI coding system for behavioral client counts and MITI for behavioral therapist counts had significant findings statistically. Results show that the client's commitment to change (CT) were significantly higher when facilitators used more MI consistent behaviors (reflections ( $p < 0.025$ ), MI consistent utterances ( $p < 0.05$ ), empathy ( $p < 0.05$ ), and time spent discussing targeted behavior ( $p < 0.025$ ) (Flickinger et al., 2013).

### **Motivational Interviewing with Significant Others (MISO)**

Motivational Interviewing with Significant Others (MISO) coding system is designed to specifically for coding the language of significant others (e.g., spouses) who are participating in a MI alcohol –related session with the client (Apodaca et al., 2007). Only the significant other's speech is coded in this system. Therefore, many researchers/practitioners choose to use MISO in conjunction with another coding system (predominately MISC or MITI). MISO has two full passes of the transcribed session (audio can also be used to assist the coding process). The entire session is parsed, and a code is assigned to each client utterance.

MISO includes three global measures and 10 behavioral codes. Global scores (Support, Collaboration, and Contemptuousness) are used to capture the overall impression of the relationship between the significant other, the client and the facilitator. During the first pass, a 7-point Likert scale is used to measure global ratings.

The following is a list and definitions of each MISO global rating:

- Support: Measures the significant other's overall investment and assistance to the client and his/her goals.
- Collaboration: Measures how well the significant other and client work together in the session.
- Contemptuousness: Measures the interactions between the significant other and the client.

During the second pass, the coder parses and codes each utterances that is spoken by the significant other and ignores the remaining utterances (unless another coding system is used that

takes into account client and/or facilitator behavioral codes). There was no strength ratings or direction added to the behavioral codes.

The following is a list and definitions of each MISO behavior code:

- Giving Information, General: Includes all statements from the significant other that provide any form of general information about the patient, but not directly regarding the client's targeted behavior.
- Giving Information, regarding patient's targeted behavior (alcohol use): Includes all statements from the significant other that provide any information regarding the client's targeted behavior.
- Encourage/Support: Includes comments from the significant other that are generally encouraging or supportive.
- Giving Advice: Includes advice (with or without permission) from the significant other to the client.
- Discuss Self: Includes all comments that significant other provides about him/herself.
- Direct: Includes all comments in which the significant other uses authoritative language when communicating with the client.
- Confront: Language that is used by the significant other that conveys disapproval or disagreement.
- Change Talk: Any language from the significant other about the client's drinking that can be categorized into language that is directed toward the targeted behavior.
- Counter Change Talk: Any language from the significant other about the client's drinking that can be categorized into that is directed away from the targeted behavior.
- Follow/Neutral: Codes any response from the significant other that does not fit into any other category.

MISO manual did not contain any instruction on how to construct summary scores or threshold requirements. Also, the MISO manual lacked detailed discussion on the training criteria, the training time required, and analysis recommendations.

MISO (in conjunction with MISC 2.0) was used to examine significant other and facilitator behaviors as predictors of client CT within MI sessions and behavioral outcomes. Similar to the early stages of client language exploration with MISC 1.0 coding system, the results were mixed but promising. Both MI consistent and MI-inconsistent behaviors failed to predict either CT or CCT, However, higher levels of significant other CT were more likely followed by higher levels of CT ( $p < .001$ ) and lower levels of CCT ( $p < .001$ ) (Apodaca, Magill, Longabaugh, Jackson, & Monti, 2013). In another study, some measures of significant other language [encourage/support ( $p < .05$ ), giving advice ( $p < .025$ ), significant other CT ( $p < .025$ ) and significant other CCT ( $p < .05$ )] were significantly and positively correlated with CT. However, there was no evidence that significant other CT being able to predict the percent days abstinent or drinks per drinking days (Manuel, Houck, & Moyers, 2012).

#### **System for Coding Couple Interaction in Therapy – Alcohol (SCCIT-A) Coding Manual**

System for Coding Couple Interaction in Therapy – Alcohol (SCCIT-A) was designed specifically to code the in-session language of therapy sessions that include a significant other in the treatment along with the client and facilitator (McCrary et al., 2013). The SCCIT-A has three coding passes on the entire length of the session. It is recommended that the first pass be completed by a different coder than the second and third pass (to increase coder reliability and decrease bias).

During the first pass, each utterance of the significant other and client is parsed (the facilitator language is not parsed or coded). In the second pass, each parsed utterance is assigned a global rating. Similar to MISO, a 5-point Likert scale is used to assign global ratings. However, SCCIT-A has a more extensive list of global ratings than MISO. SCCIT-A includes all of three MISO global rating (Support, Collaboration and Contemptuous), but global ratings are assigned to both the client and the significant other and support is separated into two unique categories (Alcohol Related Support and General support).

During the third pass, all significant other and client behavior utterances are coded using significant other behavior codes and client behavior codes. All of the behavior codes are similar

to MISO behavioral codes with the exception that SCCIT-A assign behavioral codes to both the client and the significant other

Similar to other MI coding manual, the SCCIT-A manual is extensive and includes detailed information pertaining to each global rating and behavioral code. Additionally, the SCCIT-A manual includes parsing and coding rules to assist the coder with debatable coding decisions. This aids in the training of the coders and increases sensitivity to specific treatment characteristics. Training individuals to effectively and reliably code SCCIT-A is extensive is extensive and may take a considerable amount of resources and may result in low inter-rater reliabilities and ultimately poor performing models (Owens et al., 2014).

Studies to date have used MI coding systems to examine both client and facilitator communication during a MI session (Glynn & Moyers, 2010; Moyers et al., 2007; Moyers et al., 2003). This chapter detailed the various methods used to code MI sessions. Many of the coding mechanisms were labor intensive, designed for individual client sessions, and require extensive training. The extensive resources needed to code MI sessions often result in little to no effect sizes, poorly fit models, and low inter-rater reliability (Baer et al., 2008; Lane et al., 2005; Miller & Rollnick, 2002; Moyers et al., 2003; Owens et al., 2014). Parsing and coding systems are needed to accommodate group level MI and that are cost effective, reliable, and highly efficient.

## **Chapter 3: Streamlined Parsing and Coding System for Group Level MI**

This chapter details a new streamlined parsing and coding system that was designed to reliably capture client(s) language during a group level MI session.

### **MI Coding Parsing and Coding System**

A streamlined parsing technique was used to separate the facilitator volleys from the client(s) volleys. Unique utterances within the facilitator and client volleys were grouped into clusters instead of parsing each utterance separately. Unique utterances are defined as being distinguishable from the previously coded utterance within the volley. A volley is a series of utterances spoken by the facilitator or a client. For example, when the facilitator is presenting the instructional material, and a client interrupts with a change talk comment, the two volleys are parsed and coded separately. An additional modification to MISC 2.5 parsing included the treatment of multiple clients speaking simultaneously during the session. These utterances were parsed according to their unique utterances. For example, when two or more clients responded to the facilitator, the series of utterances is defined as a “client only” volley. The “client only” volley grouped into clusters of unique utterances instead of parsing each utterance separately.

Components of MISC 2.5 and CLEAR were used to code client change talk and sustain talk. The parsed audio sessions were coding using a modified version of CASAA Application for Coding Treatment Interactions (CACTI) open-source software. The client(s) use of MISC 2.5 codes (desire, ability, reason, need, commit, taking steps, and other) was coded as change talk if the client’s utterance was directed towards the targeted change behavior. The client(s) use of MISC 2.5 codes (Desire, Ability, Reason, Need, Commit, Taking Steps, and Other) was coded as CCT if the client’s utterance was directed away from the targeted change behavior. The facilitator behavioral codes were either MI consistent or MI inconsistent (according to MISC 2.5 codes).

Two peer response codes were constructed to capture the observable, in-session peer interactions within a group level intervention MI session. The peer response towards the targeted change behavior code was used to code a non-change talk utterance following a unique utterance of CT

(or CCT) that was directed towards the targeted changed behavior. For example, after a client responded with a unique utterance of CT (“I always wear condoms”), another client responds with an affirmation towards targeted change behavior (“Good for you!”). The peer response away from targeted change behavior code was used to code a non-change talk utterance following a unique utterance of CT (or CCT) that was directed away from the targeted changed behavior. For example, after a client responded with a unique utterance of CT (“I always wear condoms”), another client responds with a derogatory statement (“That sucks!”).

Coding for the new streamlined coding system is performed in two separate passes. In the first pass, the recording is parsed into utterances and after listening to the entire length of the session the coder assigns a number to each global rating. In the second pass, the coder applies behavioral codes to each parsed utterance. The new streamlined coding system uses MISC 2.1 summary scores to determine the quality of the MI session.

## **Discussion of the Streamlined Coding System**

### **Parsing**

Parsing each intervention session was done in multiple stages. The first stage was converted MP3 file to a wav file. The wav file was then placed into CACTI to be parsed. After each unique series of utterance occurred the audio was parsed according to the pre-established parsing rules.

### Parsing Rules

A modified version of the MISC 2.5 was used to parse audio recorded AWARE sessions. The AWARE MP3 files were converted to wav files. The wav audio sessions were parsed using the parsing feature of CASAA Application for Coding Treatment Interactions (CACTI) open-source software. The parsing of the audio file was done by listening to each utterance of the session. An utterance is a complete thought spoken by the client or facilitator. Because each utterance is defined by the pre-selected language codes, the persons selected to parse must be well-trained, experienced with language coding, and have a thorough knowledge of the targeted behavior of the intervention. For example, the AWARE study targeted behavior was decrease substance use

and risky sexual behaviors. Only the client(s) speech was used in analyses for the present study. The pre-selected language codes were MISC 2.5 defined CT and CCT. CT is the sum of all of the client(s) language that was directed towards the targeted behavior. CCT is the sum of all of the client(s) language that was directed away from the targeted behavior. Client language includes commit, desire, ability, reason, need, taking steps, and other. A more detailed description of client language and MISC 2.5 is available in Chapter 2.

Oftentimes, multiple utterances are spoken without interruption. If two or more consecutive utterances are spoken that contain CT or CCT, they are parsed into separate utterances. If the parser is in doubt that an utterance is unique, parse the questionable volley is parsed into separate utterances. The modified parsing technique separated the facilitator volleys from the client(s) volleys. A volley is a series of utterances spoken by the facilitator or a client. Unique utterances within the facilitator and client volleys are grouped into clusters instead of parsing each utterance separately. Unique utterances are defined as being distinguishable from the previously coded utterance within the volley. For example, when the facilitator is presenting the instructional material, and a client interrupts with a change talk comment, the two volleys are parsed and coded separately.

Traditionally, a client utterance always terminates a counselor utterance, and the next counselor utterance becomes a new response. During group level MI sessions, the client(s) and facilitator often speak simultaneously throughout the session. In the case of simultaneous speakers, it is pertinent that the parser follows the dialogue and parses utterances that contain the targeted behavior. Language that is spoken outside of the realm of the targeted behavior is coded as Follow/Neutral. Sequences of Follow/Neutral can be combined into single, long utterances, even if the topic changes. However, instances of client change language should be parsed into separate utterances, even if the client has consecutive utterances of CT (or CCT) in a volley.

An additional modification to MISC 2.5 parsing includes the treatment of multiple clients speaking simultaneously during the session. These utterances are parsed according to their unique utterances. For example, when two or more clients responded to the facilitator, the series of utterances is defined as a “client only” volley. The “client only” volley is parsed and grouped

into clusters of unique utterances instead of parsing each utterance separately. For example, when one client's utterance of change talk is followed by another client's utterance of counter change talk, the two unique utterances are parsed and coded separately.

A volley may also include a series of utterances from the client(s) and facilitator, if the segment of the session contains only neutral utterances (with the occasional facilitator utterance), the parser may continue the volley until that series of utterances is complete (unless the utterance of CT, CCT, or peer responses occurs). This technique allows for fewer parsings and will ultimately decrease the time that it takes to code the session. However, due to the simultaneous conversations, background noise, and quality of the audio sessions in the present study, oftentimes unique volleys were parsed up into separate volleys or unique utterances. At times, it was difficult to determine if CT or CCT occurred. If the parsed volley is questionable, CACTI allows for the parsed file to be unparsed and the audio stream can be reparsed. The unparsing feature allows the parser to unparse as many five parsings (without glitches). CACTI does not permit simultaneous parsing or coding; fortunately, there were no occurrences of multiple utterances of CT or CCT throughout the course of parsing all of the three phases of the study.

### **Parsing with CACTI**

Using the CACTI software for parsing recording of intervention sessions is useful. The CACTI software is free open source software that is available to the public for use. The parsing feature runs any wav file. Researchers and practitioners are able to parse out the entire session audio session, or they may choose to only parse out the audio that they deem is necessary for their particular use.

One of the primary strengths of using CACTI to parse audio files is the user friendly interface. Once the files are stored in one folder, the CACTI file is able to open the audio file with ease. For this study, the entire audio file was parsed and coded. The audio files ranged between 38 and 56 minutes. It took approximately 75 minutes to parse each file. Additional time was needed to rewind and review questionable segments for additional parsing. The rewind, pause and unparsed functions were used to trouble shoot questionable audio segments.

The start button was used to separate each parsed file. This allowed for continuous parsing of each file. The start/stop approach is generally used when parsing only segments of the audio file. The rewind and fast-forward components of CACTI were problematic due to the glitches in the software. Other glitches include the timeline function; the use of the timeline function will most likely stall the software. Each time the software stalls; the user must quit the program and reload the wav file. This process is time consuming, taking approximately five minutes.

Another limitation is CACTI's inability to read files that are not wav files. The use of a conversion product is fairly inexpensive due to the free software available on the computer Internet. However, the time it takes to convert the MP3, MP4's or other data to a wav file should be factored into the amount of time it takes to complete the parsing and coding of each audio session. At times, the parsing is tedious due to the CACTI software not being able to read or locate the wav files. To avoid time spent to troubleshoot or multiple conversions of MP3 files to wav files, all CACTI files (MP3, wav, parsing and coded files) should be placed in the same folder. Also, once the audio file is parsed, sharing a parse file may be difficult due mainly to the CACTI software's inability to track files. The parser of the file needs to always be aware of the location of all folders and files associated with the project. Troubleshooting may be necessary when sharing files and it is important to note that the troubleshooting process may add considerable time to the parsing and coding process.

### **MI Coding**

The CACTI software was designed for the specific use of coding motivational interviewing sessions. The software can be easily modified to code motivational interviewing sessions outside of MISC 2.5. An adapted version of MISC 2.5 was used to code client CT and CCT. Only the client(s) speech was used in analyses for the present study. The parsed audio sessions were coded using a modified version of the CASAA Application for Coding Treatment Interactions (CACTI) open-source software. A client utterance that fit the MISC 2.5 codes (Desire, Ability, Reason, Need, Commit, Taking Steps, and Other) and was directed towards the targeted change behavior was coded as CT. A client utterance that fit the MISC 2.5 codes (Desire, Ability,

Reason, Need, Commit, Taking Steps, and Other) and was directed away from the targeted behavior change was coded as CCT.

Coding rules are essential to the MI coding process. This particular study used in MISC 2.5 coding rules to determine CT and CCT. However, in the case of group level MI, group level modifications were needed to accommodate the group dynamics and complexities of the audio recordings. While coding the client, facilitator, or both client/facilitator volleys, CT or CCT utterance take precedent over follow/neutral language. For example, if a client volley had two or more speakers who did not utter CT or CCT, the parse volley would be coded as follow/neutral. As another example, if a client(s) volley had a series of follow/neutral utterances, followed by an utterance of CT, the volley would be coded as CT. However, if a client(s) volley had two or more utterances of CT, a parsing error has occurred. The time of the error would be recorded and that parsed segment would be reparsed into separate unique utterances of CT or CCT. All occurrences of CT and CCT were tallied at the end of each coded session.

The following are instances of CT (towards reducing substance use and/or decrease risky sexual behaviors) from AWARE, the group level MI pilot study:

- Many of the youth who were in monogamous relationships spoke about supporting each other to reduce substance use.
- After hearing information about an extensive web of sex partners and possible transfer of sexually transmitted infections, many of the youth expressed a desire to wear condoms and get tested for HIV.
- When prompted to talk about motivations for long term sobriety and decreased substance use, many youths referred to increase financial security, affordable housing opportunities, and long term employment opportunities.
- Allergies to latex condoms prompted the request for information about safer sex alternatives.
- Many of the youth who were in monogamous relationships spoke about getting tested at least one time within their relationship and sharing their test results with their partner.

- Youth were supportive of the strategies that involved buddy systems and supplying condoms to friends while at parties or public spaces.
- Abstinence, masturbation, and sex toys were often mentioned as strategies for reducing HIV and sexually transmitted infections.
- Many youths mentioned past experiences of contracting a sexually transmitted infection as enforcing safer sex practices and the use of birth control.
- If youth reported high levels of confidence and motivation for positive behavior change, they were more likely to share stories from their past experiences of safer sex practices and moderate to low substance use.
- When youth expressed receiving support from their significant partners for making healthier life choices, their personal testimonies inspired other youth to either share their personal stories or question their risky behaviors.

The following are instances of CCT (towards increase substance use and/or risky sexual behaviors) from AWARE, the group level MI pilot study:

- When prompted to talk about the benefits of substance use, many youth referred to increased feelings of confidence, creativity, and connectedness with peers.
- Youth were averse to wearing condoms because of possible allergies, condom size and perceived poor quality.
- Some youth were felt that it would be awkward to speak with new partners about condom use.
- When prompted to talk about their triggers and past risky sexual behaviors, many youth referred to past partners, parties with access to alcohol and substance use, living in abandoned buildings with a lot of peers, and the high cost of purchasing condoms at convenience stores.
- Many youths in monogamous relationships spoke about the lack of condom use, although infidelity was mentioned in previous relationships.
- Youth talked about not wearing condoms while performing sexual acts with casual partners in public spaces, such as public restrooms.
- Many of the youth questioned the validity of statistics about the substance use and sexual activity of homeless peers. After hearing the statistics, the youth would often suggest a

variety of reasons why the results were invalid including examples their past risky habits and those of their close family and friends.

- Survival sex and the lack of private places to have sex were typical reasons why the risky sexual behavior would occur.
- The use of prostitutes and escorts was brought up by many of the male youth.
- Free condoms that were available at hospitals and other facilities were sometimes mentioned by the youth as being unreliable.
- Engaging in risky behaviors, such as excessive substance use and fighting in public, were brought up as a strategy for going to jail in order to have access to food, showers and shelter.

### **Coding with CACTI**

CACTI software was used to code the group level MI sessions. Modifications to the CACTI software were done by revising the codes in the UserConfiguration.xml file. For example, to code using exclusively client codes, delete all of the facilitator codes in the UserConfiguration.xml file. For this particular study, the UserConfiguration.xml file was modified by deleting all of the client and facilitator MISC 2.5 codes, and adding all of the streamlined codes according to the new coding rules. The coding rules state that all of the facilitator codes were either MI consistent (MICO) or MI inconsistent (MIN); all of the CT in CCT subcodes are collapsed into either CT or CCT; Peer Response towards the targeted change behavior (Peer +) was added to code positive peer responses, Peer Responses away from the targeted change behavior (Peer -) was added to code negative peer responses, and all other client language was coded Follow/Neutral (F/N). These modifications are straightforward to make, especially if coder/parser is familiar with html, xml or related coding sources.

Once the UserConfiguration.xml file is revised and saved, the CACTI.jar file is opened, and the parsed file is uploaded using the CACTI interface. The audio file is then ready to code by pressing the start button. It is recommended to use the “pause if not function” to avoid skipping parsed files. The CACTI interface streams the parsed audio with the use of a timeline. The coded buttons are located underneath the audio timeline, while the play, pause, and un-code buttons are located towards the top portion of the CACTI interface. The rewind, un-code and

paused buttons, however, have glitches. Oftentimes when operated, these buttons will stall the CACTI system and a reboot is necessary. The reboot process can be time-intensive and uploading files may also be problematic depending on how the files were stored.

### **Challenges: Identifying CT and CCT in a group setting**

Simultaneous conversation, background noise, quality of audio recording, and the facilitator's ability to maintain control/direction of the conversation are all components that could contribute to the coder's ability to accurately parse/code the session. It is essential for the parser/coder to be able to hear and follow the discussion. However, side conversations and overlapping conversations often occur during group level MI. It is recommended that the facilitator be aware of the coding process and the need for high quality audio. High quality audio, with little background noise, would improve the accuracy and efficiency of performing coding and reduce cost (Hecht et al., 2005).

It may be useful to encourage the youth to speak one at a time, or express at the beginning of the session the benefits of actively listening to their peers and respecting everyone's voice in the group. It may be challenging to implement strict adherence to this recommendation, however, due to the facilitator's responsibility to adhere to MI techniques/protocol and create an atmosphere for collaborative conversation. It is of the utmost importance that youth be able to speak freely and to express themselves, participate in various exercises, and share their personal experiences.

### **Peer Responses during the AWARE Study**

Initially, two peer response codes were constructed to capture the observable, in-session peer interactions within a group level MI session. The peer response towards the targeted change behavior code was used to code a non-CT utterance following a unique utterance of CT (or CCT) that was directed towards the targeted changed behavior. For example, after a client responded with a unique utterance of CT ("I always wear condoms"), another client responds with an affirmation towards the targeted change behavior ("Good for you!"). The peer response away

from the targeted change behavior code was used to code a non-CT utterance following a unique utterance of CT (or CCT) that was directed away from the targeted changed behavior. For example, after a client responded with a unique utterance of CT (“I always wear condoms”), another client responds with a derogatory statement (“That sucks!”). Unfortunately, there were limited occurrences of peer responses (less than two per session) within the first two phases, so the peer response construct was dropped from the study. Typically, coded constructs that occur infrequently are often difficult to code reliably and are challenging to analyze (Moyers et al., 2003).

### **Recommendations to Encourage Peer Talk and CT during Group level MI**

Oftentimes the youth would correspond directly with the facilitator and not directly react to each other’s comments/statements. It is beneficial for youth to express their experiences and beliefs and have the opportunity to question their behaviors/attitudes in a non-judgmental and collaborative environment. The onus is on the facilitator to create an environment where participants feel free to interact with one another. It is also important to decrease background noise and side conversations. The occurrence of continuous (uninterrupted) peer dialogue in the AWARE sessions led to a high number of CT utterances. For example, during a dialogue when one youth expressed how his relationship with his girlfriend encouraged him to change his substance use, another youth (who previously spoke excessive amount of CCT) began to question her beliefs concerning relationships and mentioned how she now wanted to pursue a healthy and loving relationship with the hope of having the much needed support to decrease substance use and other risky behaviors. It is unlikely that the aforementioned dialogue would have taken place in the midst of side chatter (peer extraneous conversations) and interruptive conversations (by the facilitator).

In order to increase peer interactions during a group level MI, the facilitator/interventionist may decrease their talking time and allow for the client(s) to interact with one another, reduce the number or length of exercises, reduce or eliminate national data statistics or comparisons with non-homeless youth, and encourage youth to give examples of their current behaviors or reflect upon their beliefs aloud, then allow time for questioning their statements with the use of open questions and complex reflections. Creating space for dialogue, while eliminating

confrontational and/or resistance content material, may greatly increase the number of CT and peer responses during a group level MI.

### **Policy Implications**

The use of CACTI allows for greater flexibility in determining the array and number of codes to examine, parsing by grouping together a series of volleys decreases the time it takes to parse and code, and the use of a modified version of MISC 2.5 along with CACTI accommodates both sequential and non-sequential coding which allows for greater analytical options for researchers. These benefits aid in the continued exploration of targeted underserved populations such as homeless youth, sex workers, and transgendered individuals by reducing the cost of analysis and increase access to valid research instruments.

CACTI can be used to parse facilitator, client, and individual or group interventions. The parsing of the audio session is very useful because it allows the coder to know what unit of analysis to focus upon. Each unique utterance becomes a unit of analysis and is given a code to be used during the analysis phase. Although CACTI was designed for use with MI treatments, CACTI can be used with any file that is able to be converted to wav file. This tool can be used to parse and code any audio treatment modality. This application could be very useful for researchers interested in process research and content analysis. The ability to analyze facilitator and client language without the use of transcripts is cost-effective and accessible to both practitioners and research institutions. Transcriptions can cost upward to \$100 per session. Many studies consist of 30 or more sessions lasting on average 30-45 minutes, resulting in between 300 – 1300 working hours. The additional costs of transcriptions can cost an additional \$16,000 (Klonek, Quera, & Kauffeld, 2015), making analyses that require transcription infeasible.

The CACTI software is user-friendly and easily modified by using xml coding language to accommodate any coding system (sequential or non-sequential) which can be used to assist with the exploration of a range of research questions. CACTI software allows researchers to examine both facilitator competence/skills and client language. CACTI software preserves the unit of

analysis of the coded data and, as such, future studies could apply it to test specific predictive qualities of group behavior; for example, to examine whether increased peer interactions are associated with improved individual-level substance use behaviors and attitudes. As another example, CACTI could be used to examine MI facilitator(s) ability to maintain high rates of MI techniques (open ended questions, complex/simple reflections, collaboration, and spirit of MI) during different types of groups (varying gender, age, educational attainment, and race/ethnicity).

There are several other useful applications of CACTI for practitioners and researchers. The CACTI software can be adapted for the use of training purposes to assist with identifying missed facilitator opportunities to utilize MI technique or to track inconsistent MI behaviors. CACTI playback functions allow review of parsed and coded utterances to be done with relative ease. This would allow for interactive feedback and may increase the facilitator's overall MI adherence (Barnett, Spruijt-Metz, et al., 2012). Past studies successfully showed that specialized training that emphasized the evocation and reinforcement of CT (as opposed to standard MI training) increased the amount of CT during subsequent treatment sessions (Moyers et al., 2011). Interactive and specialized training research is needed to examine the effects of experimental training manipulations to increase CT or decrease CCT.

CACTI software could aid in the development or improvement of pilot studies. The amount of CT and CCT can be recorded following each exercise that is used throughout the group level MI session. For example, the presentation of national data to reinforce social norms had a negative impact on the youth in that the number of CCT increased after each instance of this approach. The interventionist may consider replacing segments of the protocol with national data statistics with open dialogue about personal experiences with substance use or peer influences (the number of CT increased during these segments of the protocol). It may be useful for researchers and practitioners to have a systematic approach to determining the most effective components of their protocol with the desired targeted population. This would be exceptionally useful for targeted populations that are not as heavily researched.

Lastly, there is a need to expand the training material for coding application. The Center for Alcoholism, Substance Abuse, and Addiction (CASAA) at the University of New Mexico is the premier MI coding institution. Although the center provides MI year round, there is little to no coding training available to the public outside of MITI. There was no training material for the CACTI application. Many of the current training materials, including manuals and practice coding exercises, are unpublished material available on the internet. There is an opportunity for the community based practitioners, as well as academic based researchers, to contribute to the expansion of training material by documenting their interventions and applications and modifications of the CACTI software.

## **Chapter 4: Research Application of Streamline Parsing and Coding Method**

This chapter evaluates the use of a streamlined parsing and coding system to detect client change talk (CT) and counter change talk (CCT) in a group setting and how exposures to CT and CCT during group MI predict changes in client attitudes, intentions, and behaviors over a 3-month period.

### **MI Intervention**

The streamlined parsing and coding process was tested using data collected for AWARE, a pilot study funded by the National Institutes of Health in May 2013. The AWARE study consists of a voluntary intervention delivered within drop-in center settings for homeless youth. The main goal of the pilot study was to evaluate the efficacy of an innovative group-based motivational interviewing intervention for homeless young adults in terms of reducing their substance use- and HIV-related intentions and risk behaviors over a 3-month period.

A RAND facilitator was selected who had a background comparable to that of a staff member that would be likely to deliver an MI group level intervention at a homeless youth shelter or drop-in facility. Characteristics include college educated (bachelor's degree or above), health background, enthusiastic, experienced and at ease in working with the underserved population. The interventionist training was conducted by RAND researchers Drs. Tucker and D'Amico, who have extensive experience in MI-based youth risk reduction programs. Training included role play exercises, MI practice exercises, and extensive review of the intervention protocol. Sessions were audiotaped and reviewed during weekly group clinical supervision sessions.

Global ratings of each AWARE session were assigned using MISC 2.5 global ratings. The vast majority of the sessions were rated as MI consistent (mean = 4.5, SD = 0.25); the global scores were based on global facilitator ratings. The MITI 3.0 standard threshold is 3.5 for a beginner level MI facilitator and 4.0 for an experienced MI consistent facilitator. The AWARE facilitator rated above average. In addition, 25% of the sessions were also coded using MITI to ensure inter-rater reliability of global ratings and MI fidelity. The facilitator rated above average (mean

= 4.41, SD = 0.39), providing additional evidence that there was a minimal variation of the sessions and the AWARE facilitator was using MI techniques. Dr. D'Amico and Dr. Tucker listened to each session and provided feedback to the facilitator on a weekly basis. The facilitator met industry standards and delivered the intervention in an MI-consistent manner (Barnett, Spruijt-Metz, et al., 2012; Dunn et al., 2001; Kealey et al., 2009).

The 4-session group-based MI intervention focused on the youth's individual substance use and risky sexual behavioral practices by utilizing personalized feedback, role play exercises, and interactive protective strategy exercises. Providing youth with personalized feedback sheets was intended to strength their engagement in the program by increasing its personal relevance and provide youth with additional information about resources that are available to them within their local community. Each session included content that emphasized the interrelated nature of substance use and risky sexual behaviors. The field period was divided into four phases, each lasting 16 weeks, with the intervention being delivered at one drop-in center during Phases 1 and 3, and at the other drop-in center during Phases 2 and 4. The 4-session intervention was repeated multiple times per phase. This study utilizes data from the first three phases (42 AWARE sessions, 71 participants).

The following is a detailed overview of the each lesson's content.

In Lesson 1, youth were provided with personalized feedback about their risky sexual behaviors and how they compared to national data. Youth also received factual information on the transmission of HIV/STI. Finally, youth participated in an interactive demonstration to develop skills to use condoms effectively.

In Lesson 2, youth discussed personal triggers regarding risky sexual behaviors. Youth watched a role play exercise about how to discuss condom use with partners and discussed how they might go about discussing condom use with their own partners. Next, youth strategized about creating an action plan in order to make healthier choices when encountering risky sexual environments (such as parties and night clubs). Lastly, youth used confidence and motivational

rulers to assess their current willingness and confidence to use condoms during sexual intercourse.

In Lesson 3, youth were provided with personalized feedback about their substance use and how they compared to national data. Youth completed a decisional balance exercise in which they listed the pros and cons of substance use and considered how to weigh these pros and cons in making healthier choices. Lastly, youth used confidence and motivational rulers to assess their current willingness and confidence to decrease their substance use or maintain healthy substance use behavior.

In Lesson 4, youth discussed long-term effects of substance use on a developing brain. Youth were also provided personalized feedback on the consequences of substance use and how they compared to national data. Lastly, youth brainstormed about strategies to avoid situations that may occur because of substance use and risky sexual behavior.

### **Sample Recruitment**

The term “homeless youth” is broad and can encompass runaways who leave their home without parental or guardian consent, “throwaways” who are forced out of their homes, system and foster care youth who have problematic social service placements, and youth whose families become homeless. This study defines homeless youth as unaccompanied homeless individuals aged 18-25 who are on their own, not living with or getting significant financial support from a parent or guardian (Levinson, 2004; Tucker, 2007; Witkin et al., 2005).

Participants for the pilot study were recruited from two agencies serving homeless youth in Los Angeles County: My Friend’s Place and Safe Place for Youth. Both of these agencies primarily serve homeless youth in the transition to young adulthood (ages 18-25) and offer similar services. My Friend’s Place, located in Hollywood, is a nonprofit drop-in center offering a comprehensive continuum of care services that includes free emergency resources such as food and clothing in combination with health, educational, and therapeutic services to homeless youth. A Safe Place for Youth (S.P.Y.), located in Venice, provides street outreach, drop-in center, and case management.

To be eligible for the study, youth must have met the following criteria: 1) between the ages of 18-25; 2) receiving services at one of the participating drop-in centers; 3) no cognitive impairment observed during the screening process; 4) planning to be in the study area for the next month; and 5) English speaking.

### **Design and Procedures**

All materials and procedures were approved by RAND's Institutional Review Board. Youths were recruited and screened at agency locations by trained staff who also conducted the follow-up interviews. Eligible youths were then randomized to either attend an intervention session immediately following completion of the baseline survey or to a usual care control group that received a Community Resource Guide listing free or low-cost health services in the study area and information on HIV prevention. Only intervention group participants are considered in this study.

The baseline surveys were self-administered and designed to take approximately 20 minutes to complete. Participants were contacted 3 months after the baseline assessment to complete a self-administered survey which included the same behavioral and psychosocial variables as the baseline survey. Youth were compensated for their participation in the baseline survey, each intervention session, and the follow up survey.

The researcher parsed and coded all AWARE intervention sessions from the first three phases of the evaluation. Four of these intervention sessions (9.5 %) were double coded (by both the researcher and the trainer) to ensure adherence to the parsing and coding procedures.

### **Measures**

The following are measures that were included in the baseline and follow up surveys:

### Background Characteristics

Collected information included youth's age, gender, race and ethnicity, sexual orientation, and length of homelessness.

### Substance Use Behavior

Substance use was self-reported by the youth, which is consistent with research literature. , Self-report of substance use is a reasonable measure of use patterns and treatment outcomes (Aguinis, Pierce, & Quigley, 1995; Brener, Billy, & Grady, 2003; Midanik, 1988). The following are the substance use behavioral outcomes that were used for the study:

Frequency of alcohol use (drank at least one full drink of alcohol) in the past 3 months, was assessed using a 7 point scale (0 = never, 1 = <1/month, 2 = 1x/month, 3 = 2-3x/month, 4 = 1x/week, 5 = 2-3x/week, 6 = 4-5x/week, 7 = every day).

Binge drinking (drank 5 or more drinks of alcohol in a row, that is, within a couple of hours) in the past 3 months, was assessed using a 7 point scale (0 = never, 1 = <1/month, 2 = 1x/month, 3 = 2-3x/month, 4 = 1x/week, 5 = 2-3x/week, 6 = 4-5x/week, 7 = every day).

Marijuana in the past 3 months, was assessed using a 7 point scale (0 = never, 1 = <1/month, 2 = 1x/month, 3 = 2-3x/month, 4 = 1x/week, 5 = 2-3x/week, 6 = 4-5x/week, 7 = every day).

Youth responded to a series of questions regarding 10 substance categories: synthetic cannabis, crack, cocaine, heroin, methamphetamine, ecstasy, hallucinogens, inhalants, over-the-counter medicines. A dummy variable was created to represent any substance within the past three months and no use. Next, a weighted sum variable was derived for substance use, where marijuana and synthetic cannabis received a weight of 1, inhalants, hallucinogens, ecstasy, over-the-counter medicines received weights of 2, and cocaine, crack, heroin, and methamphetamine received weights of 3. The resulting substance use variable ranged from 0 (no use of any of substances) to 22 (use of all of them).

### Rulers

Separate substance use and risky sexual rulers were used to assess the importance, readiness, and confidence to change alcohol use, marijuana use, other drug use, and condom use on an 11-point scale (0 = not at all to 10 = extremely) (Boudreaux et al., 2012).

### Sexual Behavior

The following questions were asked of the participants past 3 month sexual behavior: a) total number of sexual partners (primary and casual); b) frequency of vaginal and anal sex (primary and casual encounters); and c) frequency of condom use while performing vaginal and anal sex. A variable was derived to calculate the percentage of condom use by dividing the number of times they used a condom by the number of times they engaged in vaginal or anal sex.

### Sexual Protective Strategies

Sexual Protective Strategies was assessed by asking youth to rate how often they engaged (using the scale: 0 = never, 1 = rarely, 2 = sometimes, 3 = usually, 4 = always) on a series of questions (Bryan et al., 2007; Lewis, Logan, & Neighbors, 2009):

- Tell my partner that I want to use a condom.
- Have a mental plan to talk to my partner about condom use before we have sex.
- Talk about condom use with my partner before we have sex.
- Have a mental plan to use a condom.
- Carry a condom and keep it handy.
- Buy condoms.
- Avoid alcohol or drug use before sex.

All of the scores were averaged to derive the sexual protective strategies outcome.

### Sexual Intentions

Sexual intentions was assessed by asking youth to rate how likely (using the scale: 1 = not at all likely, 4 = moderately likely, 7 = extremely likely) they were to do a series of activities (Bryan et al., 2007):

- Buy or get condoms.

- Carry condoms with you.
- Talk to a sex partner about using condoms.
- Use a condom every time you have sex.
- Have sex after drinking or using drugs.
- Use a condom when you've been drinking or using drugs.
- Get tested for HIV and sexually transmitted infections.

All of the scores were averaged to derive the sexual intentions outcome.

### Condom use self-efficacy

Condom self-efficacy was assessed by asking youth to rate their confidence (using the scale: 1 = strongly disagree, 2 = sort of disagree, 3 = sort of agree, 4 = strongly agree) on a series of questions (Brafford & Beck, 1991; Brien, Thombs, Mahoney, & Wallnau, 1994; Forsyth, Carey, & Fuqua, 1997):

- I feel confident in my ability to discuss condom use with any partner I might have.
- I feel confident in my ability to suggest using condoms with a new partner.
- I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I have a sexually transmitted infection.
- I would not feel confident suggesting using condoms with a new partner because I would be afraid he or she would think I thought they had a sexually transmitted infection.
- I feel confident in my ability to put a condom on myself or my partner quickly.
- I feel confident that I would remember to use a condom even after I have been drinking.
- I feel confident in my ability to use a condom correctly.
- I feel confident that I would remember to use a condom even if I were high.

All of the scores were averaged to derive the condom self-efficacy outcome.

### **Statistical Analysis**

Descriptive statistics (mean, standard deviation) of CT and CCT were calculated. Descriptive statistics (mean, standard deviation) of the baseline covariates were also calculated. Next, CT and CCT were related to the outcomes of interest using multivariate linear regression modeling.

There were 71 clients who participated in the first three phases of the intervention, 68 clients completed the follow-up survey. The three who were lost to follow up had a very similar demographic profile to the sample as a whole.

Due to the small sample size ( $n=68$ ), the bootstrapping method was used (Efron & Tibshirani, 1986). Upon review of the correlation matrix with the baseline covariates and CT and CCT, the baseline covariates were rarely associated with the CT and CCT. This inquiry resulted in an analysis computing bootstrap models controlling only for baseline measure of the outcome of interest.

## **Results**

### **Coded Sessions**

There were 42 AWARE sessions that were coded which represented three phases of the intervention. Each session was coded for CT and CCT. A total of 70 youth participated in the intervention, with youth attending an average of 2.84 sessions ( $SD = 1.28$ ). For each youth, mean CT and CCT scores were calculated for the sessions that he or she attended. Overall, there was more CT (mean = 110.71,  $SD = 58.15$ ) than CCT (mean = 84.32,  $SD = 47.12$ ).

Table 4 shows the amount of group-level CT and CCT at each of the four lessons across all three phases to determine which lessons were more or less likely to elicit this type of language. For each of the four lessons, the number and percentage of CT remarks and number and percentage of CCT remarks were calculated.

**Table 4:** Means and Standard Deviations of CT and CCT for Each Lesson Across All Three Phases

<b>Lesson</b>	<b>Number of Sessions</b>	<b>Change Remarks Mean</b>	<b>Change Remarks (SD)</b>	<b>Counter Change Remarks Mean</b>	<b>Counter Change Remarks (SD)</b>	<b>Change Talk as % of Total</b>	<b>Counter Change Talk as % of Total</b>
1	14	47.29	(14.09)	25.57	(13.02)	0.65	0.35
2	12	36.50	(6.65)	33.50	(13.02)	0.52	0.48
3	9	41.11	(17.66)	35.67	(8.50)	0.54	0.46
4	7	26.43	(10.94)	21.71	(5.28)	0.55	0.45

Table 4 shows that, on average, youth expressed more CT in Lessons 1 and 3 than in Lessons 2 and 4, and more CCT in Lessons 2 and 3 than in Lessons 1 and 4. Session 4 produced the least amount of CT and CCT for the three phases combined. Overall, participants tended to make more CT remarks than CCT remarks.

**Table 5:** Means and Standard Deviations of CT and CCT for Each Lesson During Phase 1

<b>Lesson</b>	<b>Number of Sessions</b>	<b>CT Remarks (Mean)</b>	<b>CT Remarks SD</b>	<b>CCT Remarks (Mean)</b>	<b>CCT Remarks SD</b>	<b>CT as % of Total</b>	<b>CCT as % of Total</b>
1	4	63.00	11.05	26.25	13.82	0.71	0.29
2	4	39.00	6.48	34.75	16.15	0.53	0.47
3	3	52.67	20.55	40.67	7.37	0.56	0.44
4	2	39.00	5.66	21.00	12.73	0.65	0.35

Table 5 shows that youth more often expressed CT in Lessons 1 and 3, than in Lessons 2 and 4 for the first phase of the study. CCT remarks were more often expressed in Lessons 2 and 3 than in Lessons 1 and 4 for the first phase of the study. Participants in Lessons 1 and 4 expressed more CT during the first phase of the study than in the other two phases.

**Table 6:** Means and Standard Deviations of CT and CCT for Each Lesson during Phase 2

<b>Lesson</b>	<b>Number of Sessions</b>	<b>CT Remarks (Mean)</b>	<b>CT Remarks SD</b>	<b>CCT Remarks (Mean)</b>	<b>CCT Remarks SD</b>	<b>CT as % of Total</b>	<b>CCT as % of Total</b>
1	5	35.80	3.56	28.00	18.68	0.56	0.44
2	4	31.50	5.80	27.75	7.93	0.53	0.47
3	3	25.33	3.51	34.67	6.11	0.42	0.58
4	3	22.33	9.07	22.33	1.15	0.50	0.50

Table 6 shows that youth more often expressed change talk in Lessons 1 and 2, than in Lessons 3 and 4 for the second phase of the study. Counter change talk remarks were more often expressed in Lesson 3, than in Lessons 1, 2 and 4 for the second phase of the study. The percent of counter change talk exceeded change talk among Lesson 3 in the second phase of the study.

**Table 7:** Means and Standard Deviations of CT and CCT for Each Lesson during Phase 3

<b>Lesson</b>	<b>Number of Sessions</b>	<b>CT Remarks (Mean)</b>	<b>CT Remarks SD</b>	<b>CCT Remarks (Mean)</b>	<b>CCT Remarks SD</b>	<b>CT as % of Total</b>	<b>CCT as % of Total</b>
1	5	46.20	11.30	22.60	6.35	0.67	0.33
2	4	39.00	6.06	38.00	14.99	0.51	0.49
3	3	45.33	14.57	31.67	11.59	0.59	0.41
4	2	20.00	8.49	21.50	0.71	0.48	0.52

Table 7 shows that youth more often expressed change talk in Lessons 1 and 3, than in Lessons 2 and 4 for the third phase of the study. Counter change talk remarks were more often expressed in Lessons 2 and 3, than in Lessons 1 and 4 for the third phase of the study. The percent of counter change talk exceeded change talk among Lesson 4 in the third phase of the study.

## Descriptive Statistics

Table 8 shows the demographic characteristics of the sample. The sample age ranged from 18 to 25, with a mean age of 21.82 ( $SD = 1.72$ ). Slightly less than three quarters of the participants were male (71% male; 29% female). Participants self-identified as Caucasian (25%), African American (25%), Hispanic/Latino (25%), or other race (25%). Participants self-identified as heterosexual (71%), gay/lesbian (12%), and as bisexual (17%). On the basis of self-report, the researcher determined that the average length of homelessness was 2.17 years ( $SD = 2.67$ ). About half (51%) of participants completed all 4 AWARE lessons.

**Table 8.** Descriptive statistics ( $N=68$ )

<b>Variable</b>	<b>Mean (SD) / %</b>
<b>Mean age of years</b>	21.82 (1.72)
<b>Mean length of homelessness in years</b>	2.17 (2.67)
<b>Gender</b>	
Male	71%
Female	29%
<b>Race/Ethnicity</b>	
Non-Hispanic White	25%
Non-Hispanic African-American	25%
Hispanic	25%
Other	25%
<b>Sexual orientation</b>	
Heterosexual	71%
LGBT	29%
<b>Number of AWARE sessions attended</b>	2.93 (1.40)
1	22%
2	24%
3	3%
4	51%

Table 9 compares the sample on the outcomes of interest at baseline and the 3-month follow-up. Substance use at the 3-month follow-up was slightly less than at baseline. The substance use rulers measuring the participant's importance, readiness, and confidence to change their behavior were higher at the 3-month follow-up than at baseline. The number of sexual partners, protective sexual strategies and sexual intentions were slightly lower at the 3 month follow up. The percentage of protected sex acts and was slightly higher at baseline than at the 3-month follow-up. The condom use rulers measuring the participant's readiness and confidence to change their behavior was higher at the 3-month follow-up than at baseline, while the importance ruler was slightly lower at follow-up than at baseline.

**Table 9.** Descriptive statistics for outcomes at baseline and follow-up (N=68)

Outcome	Mean (SD) / %	
	Baseline	Follow up
Alcohol use and attitudes		
Alcohol use, 3 months	2.74 (2.16)	2.00 (2.11)
Binge Drinking, 3 months	2.12 (2.13)	1.52 (1.92)
Alcohol importance ruler	6.00 (3.77)	6.19 (3.77)
Alcohol readiness ruler	6.29 (3.69)	6.65 (3.59)
Alcohol confidence ruler	6.56 (3.53)	7.26 (3.35)
Marijuana use and attitudes		
Marijuana use, 3 months	4.39 (2.70)	3.57 (3.05)
Marijuana importance ruler	4.24 (3.89)	4.66 (3.86)
Marijuana readiness ruler	4.18 (3.70)	4.40 (3.91)
Marijuana confidence ruler	4.44 (3.82)	5.04 (4.13)
Other drug use and attitudes		
Drug use severity, 3 months	5.69 (6.30)	4.41 (6.44)
Other drug importance ruler	6.25 (4.09)	7.22 (3.83)
Other drug readiness ruler	6.32 (3.94)	7.41 (3.61)
Other drug confidence ruler	6.47 (3.88)	7.49 (3.53)
Sexual behavior and attitudes		
# sex partners, 3 months	3.02 (3.77)	3.04 (4.80)
% protected sex, 3 months	0.50 (0.44)	0.47 (0.42)
Sexual protective strategies	2.05 (1.19)	2.01 (1.26)
Sexual intentions	3.84 (1.81)	3.79 (1.92)
Condom self-efficacy	2.88 (0.80)	3.05 (0.56)
Condom importance ruler	6.12 (3.99)	6.19 (3.87)
Condom readiness ruler	6.32 (3.88)	6.18 (3.92)
Condom confidence ruler	6.50 (3.88)	6.06 (3.87)

*Notes.* Past 3 month alcohol, heavy alcohol, and marijuana use: 1=*never* to 8=*every day*. Past 3 month other drug use: possible range=0 to 22. Rulers: 0=*not at all* to 10=*extremely*. Sexual protective strategies: 0=*never* to 4=*always*. Sexual protection intentions: 1=*not at all likely* to 7=*extremely likely*. Condom self-efficacy: 1=*strongly agree* to 4 = *strongly disagree*.

## Analysis

The researcher examined whether different CT at the group level were associated with improved youth individual-level alcohol use outcomes and whether CCT were associated with worse individual-level alcohol use outcomes. The researcher used the baseline measure of the outcome as a covariate in the models. The limited model is the preferred approach given the relatively small sample size and the fact that many of the baseline covariates used in the expanded models were rarely associated with CT and CCT.

**Table 10.** Alcohol Use and Attitudes: Parameter Estimates

CT and CCT	Outcomes		
	Alcohol Use Past 3 Months		Binge Drinking Past 3 Months
CT Session 1	0.017 (0.012)		0.008 (0.011)
CT Session 2	-0.017 (0.027)		0.006 (0.026)
CT Session 3	-0.005 (0.017)		-0.004 (0.018)
CT Session 4	-0.013 (0.027)		-0.007 (0.022)
CCT Session 1	-0.018 (0.021)		-0.009 (0.017)
CCT Session 2	-0.002 (0.024)		-0.012 (0.022)
CCT Session 3	0.010 (0.026)		0.010 (0.0266)
CCT Session 4	-0.023 (0.044)		-0.039 (0.036)

  

CT and CCT	Importance Ruler	Readiness Ruler	Confidence Ruler
CT Session 1	<b>-0.043 (0.024)#</b>	<b>-0.048 (0.023)*</b>	-0.035 (0.022)
CT Session 2	-0.005 (0.051)	0.038 (0.054)	0.024 (0.044)
CT Session 3	0.009 (0.030)	0.037 (0.024)	<b>0.049 (0.023)*</b>
CT Session 4	<b>0.104 (0.048)*</b>	0.078 (0.051)	0.046 (0.049)
CCT Session 1	<b>0.083 (0.034)*</b>	<b>0.075 (0.034)*</b>	<b>0.059 (0.030)#</b>
CCT Session 2	0.046 (0.043)	0.014 (0.047)	0.001 (0.040)
CCT Session 3	-0.011 (0.045)	<b>-0.066 (0.038)#</b>	-0.022 (0.035)
CCT Session 4	<b>-0.106 (0.064)#</b>	-0.069 (0.066)	<b>-0.120 (0.063)#</b>

*Notes.* All bootstrap analyses control for baseline outcome #  $p < .10$  \*  $p < .05$

Overall, CT and CCT utterances were not associated with significant changes in alcohol use and binge drinking over the 3-month follow-up period. However, there were several statistically

significant ( $p < .05$ ) and marginally significant ( $p < .10$ ) associations with the rulers, not always in the expected direction. Youth who were exposed to more CT in Lesson 1 showed a marginal decrease in their importance to reduce their alcohol use and youth who were exposed to more CT in Lesson 1 showed a statistical decrease in their readiness to reduce their alcohol use. However, youth exposed to more CT in Lesson 3 and Lesson 4 showed a statistical increase in their importance and confidence for reducing their alcohol use. Further, youth who were exposed to more CCT in Lessons 1 showed a marginal increase in the confidence of changing their alcohol use and statistical increase in their importance and readiness of changing their alcohol use. But those exposed to more CCT in Lesson 3 showed a marginal decrease in their readiness to change their alcohol use and youth exposed to more CCT in Lesson 4 showed a marginal decrease in their importance and confidence to change their alcohol use.

The researcher examined whether different CT at the group level were associated with improved youth individual-level drug use outcomes and whether CCT were associated with worse individual-level alcohol use outcomes. The researcher used the baseline measure of the outcome as covariates in the models.

**Table 11.** Drug Use and Attitudes: Parameter Estimates

CT and CCT	Outcomes			
	Past 3 Months Use	Importance Ruler	Readiness Ruler	Confidence Ruler
<b>Marijuana</b>				
CT Session 1	0.013 (0.017)	0.018 (0.024)	-0.004 (0.024)	-0.018 (0.026)
CT Session 2	0.029 (0.038)	-0.002 (0.047)	-0.046 (0.045)	-0.064 (0.042)
CT Session 3	0.015 (0.026)	0.014 (0.034)	0.003 (0.037)	0.058 (0.037)
CT Session 4	-0.050 (0.043)	0.064 (0.049)	0.043 (0.049)	0.028 (0.049)
CCT Session 1	-0.041 (0.030)	-0.002 (0.039)	0.021 (0.038)	0.043 (0.041)
CCT Session 2	-0.020 (0.036)	0.040 (0.043)	<b>0.080 (0.047)#</b>	<b>0.105 (0.040) †</b>
CCT Session 3	-0.031 (0.040)	0.008 (0.047)	0.008 (0.048)	-0.051 (0.052)
CCT Session 4	0.035 (0.066)	-0.055 (0.067)	-0.060 (0.065)	-0.027 (0.070)
<b>Other Drugs</b>				
CT Session 1	-0.023 (0.036)	-0.022 (0.024)	-0.007 (0.022)	-0.011 (0.022)
CT Session 2	<b>0.155 (0.075)*</b>	-0.034 (0.056)	0.014 (0.044)	0.019 (0.040)
CT Session 3	<b>-0.082 (0.044)#</b>	0.010 (0.030)	0.007 (0.029)	0.016 (0.025)
CT Session 4	0.022 (0.059)	0.041 (0.052)	0.023 (0.045)	0.052 (0.041)
CCT Session 1	-0.005 (0.048)	0.028 (0.038)	0.024 (0.036)	0.021 (0.036)
CCT Session 2	<b>-0.156 (0.059) †</b>	0.051 (0.050)	0.008 (0.045)	0.002 (0.042)
CCT Session 3	0.077 (0.075)	-0.040 (0.045)	-0.039 (0.044)	-0.057 (0.038)
CCT Session 4	-0.028 (0.103)	0.016 (0.090)	0.017 (0.068)	0.008 (0.062)

*Notes.* Separate bootstrap models were run for marijuana and other drug outcomes. All analyses control for baseline outcome. #  $p < .10$ . \*  $p < .05$ . †  $p < .01$

Overall, CT and CCT utterances were not associated with significant changes in marijuana use over the 3-month follow-up period. However, there were a couple marginally significant ( $p < .10$ ) and statistically significant ( $p < .01$ ) associations with the rulers. Youth who were exposed to more CCT in Lesson 2 showed a marginal increase in their readiness and statistical increase in the confidence to reduce their marijuana use.

Overall, CT and CCT utterances were associated with significant changes in other drug use over the 3-month follow-up period, not always in the expected direction. CT was associated with statistically significant increases in other drug use ( $p < .05$ ) in Lesson 2, and CCT was associated with statistically significant decreases in other drug use ( $p < .01$ ) in Lesson 2. One marginally significant ( $p < .10$ ) association was seen with other drug use. Overall, CT and CCT utterances were not associated with significant changes in the youth importance, readiness, and confidence to reduce their other drug use over the 3-month follow-up period.

The researcher examined whether different CT at the group level were associated with improved youth individual-level sexual behavior and attitudes outcomes and whether CCT were associated with worse individual-level sexual behavior and attitudes outcomes. The researcher used the baseline measure of the outcome as covariates in the models.

**Table 12.** Sexual Behaviors and Attitudes: Parameter Estimates

CT and CCT	Outcomes			
	# of Sex Partners	% Sex With Condom	Sexual Protective Strategies	Sexual Intentions
CT Session 1	-0.034 (0.033)	0.003 (0.003)	-0.0001 (0.005)	0.010 (0.014)
CT Session 2	0.031 (0.062)	<b>0.015 (0.005) †</b>	-0.002 (0.016)	-0.033 (0.025)
CT Session 3	0.039 (0.050)	-0.002 (0.004)	<b>0.015 (0.008)#</b>	0.019 (0.017)
CT Session 4	0.001 (0.043)	<b>0.016 (0.007)*</b>	-0.008 (0.013)	-0.014 (0.032)
CCT Session 1	0.060 (0.043)	0.003 (0.007)	0.002 (0.009)	-0.012 (0.019)
CCT Session 2	-0.071 (0.044)	<b>-0.009 (0.004)*</b>	0.002 (0.013)	0.018 (0.024)
CCT Session 3	-0.044 (0.057)	-0.005 (0.007)	<b>-0.022 (0.011)#</b>	-0.013 (0.024)
CCT Session 4	0.005 (0.083)	-0.017 (0.011)	0.013 (0.019)	0.009 (0.043)

  

CT and CCT	Condom Self-Efficacy	Condom Importance Ruler	Condom Readiness Ruler	Condom Confidence Ruler
	CT Session 1	0.0004 (0.004)	0.024 (0.031)	0.010 (0.029)
CT Session 2	<b>-0.014 (0.007)#</b>	-0.018 (0.053)	-0.033 (0.048)	-0.015 (0.050)
CT Session 3	0.002 (0.004)	0.032 (0.030)	<b>0.053 (0.026)*</b>	0.032 (0.028)
CT Session 4	-0.0002 (0.008)	-0.043 (0.060)	-0.029 (0.059)	-0.047 (0.059)
CCT Session 1	-0.009 (0.008)	-0.024 (0.043)	-0.021 (0.043)	-0.043 (0.044)
CCT Session 2	<b>0.014 (0.007)#</b>	-0.005 (0.048)	0.009 (0.044)	0.012 (0.045)
CCT Session 3	-0.006 (0.006)	0.005 (0.044)	-0.012 (0.040)	-0.006 (0.040)
CCT Session 4	0.011 (0.010)	0.045 (0.085)	0.040 (0.082)	0.085 (0.081)

Notes. All bootstrap analyses were control for baseline outcome. #  $p < .10$ . \*  $p < .05$ . †  $p < .01$

Overall, CT and CCT utterances were not associated with significant changes in number of sexual partners use over the 3-month follow-up period. However, CT and CCT utterances were associated with significant changes in number of percentage of protected acts use over the 3-month follow-up period in Lessons 2 and 4. CT was associated with statistically significant increases in the percentage of protected acts in Lesson 2 ( $p < .01$ ) and Lesson 4 ( $p < .05$ ). CCT was

associated with statistically significant decreases in the percentage of protected acts ( $p < .05$ ) in Lesson 2. There were several significant ( $p < .05$ ) and marginally significant ( $p < .10$ ) associations with sexual protective strategies, condom self-efficacy and condom readiness ruler, but not always in the expected direction. Youth who were exposed to more CCT in Lesson 3 showed a marginal increase in their protective sexual strategies. Youth who were exposed to more CCT in Lesson 3 showed a marginal decrease in their protective sexual strategies. Youth who were exposed to more CT in Lesson 2 showed a marginal decrease in condom self-efficacy and youth who were exposed to more CCT in Lesson 2 showed a marginal increase in condom self-efficacy. Youth who were exposed to more CT in Lesson 3 showed a significant increase in their condom readiness ruler.

## Discussion

The current study evaluates the use of a streamlined parsing and coding system to detect CT and CCT in a group setting and how exposures to CT and CCT during group MI predict changes in client attitudes, intentions, and behaviors over a 3-month period. The results were promising, with significant effects primarily found for the importance, confidence, and readiness to change rulers. Change rulers are known to be a valid instrument in predicting substance use and risky sexual behavioral intentions (Bertholet, Gaume, Faouzi, Gmel, & Daeppen, 2012; LaBrie, Quinlan, Schiffman, & Earleywine, 2005). Homeless youth who demonstrate increased importance, confidence, and readiness to reduce their substance use may be more likely to make healthier decisions in the long term. Further research is needed to explore longer term effects of group level MI interventions for homeless youth.

There is some evidence that the level of exposure to CT and CCT influence alcohol-related attitudes. It is possible that these initial effects on importance, confidence and readiness to change alcohol use may eventually translate into positive behavior change. In Session 3, which focuses on short and long term pros/cons of substance use, youth exposed to more CT showed increased confidence to change ( $p < .05$ ), and those exposed to more CCT showed decreased readiness to change ( $p < .10$ ). In Session 4, which focused on long term effects of substance use on the adolescent brain and risk avoidance substance use strategies, youth exposed to more CT reported increased importance to change ( $p < .05$ ), and those exposed to more CCT reported decreased importance ( $p < .10$ ) and confidence ( $p < .10$ ) to change alcohol use. The one counter-intuitive finding is that exposure to more CT in Session 1, in which youth were provided with personalized feedback about their risky sexual behaviors and national data pertaining to HIV/STI transmission, was associated with decreased importance ( $p < .10$ ) and readiness ( $p < .05$ ) to change alcohol use, and exposure to more CCT in Session 1 was associated with increased importance ( $p < .05$ ), readiness ( $p < .05$ ) and confidence ( $p < .10$ ) to change. A possible reason for this result may be the high volume of resistance to the national data statistics that were presented during Session 1. Many of youth (across all three phases), questioned the validity of the national data and struggled with the mathematical (percentages and likelihood) oriented questions. The facilitator experienced difficulty obtaining trust and cooperation during those segments of the

discussion. Evidence suggests that less resistance and a high percentage of CT (compared to CCT) within sessions is associated with better outcomes (Amrhein et al., 2003; Karver, Handelsman, Fields, & Bickman, 2006; Moyers, Martin, Houck, Christopher, & Tonigan, 2009; Shirk & Karver, 2003)

For each outcome of interest, multivariable regression analysis was used to examine whether the level of exposure to CT at the group level was associated with improved client individual-level substance use- and sexual behavior-related outcomes and whether level of exposure to CCT was associated with worse client individual-level substance use- and sexual behavior-related outcomes. CT and CCT utterances were not associated with significant changes in alcohol use over the 3-month follow-up period. In the study, CCT oftentimes was followed by more CCT, especially during conversations regarding positive aspects of alcohol use. For example, when prompted to talk about the benefits of substance use, many youth referred to increased sense of false confidence (“beer balls”) which may increase their likelihood to have sex with strangers or react aggressively towards others. High levels of CCT, may result in iatrogenic effects, which may have impacted the study results (Dishion, McCord, & Poulin, 1999; Dishion, Poulin, & Burraston, 2001; Gould et al., 2005; Kaminer, 2005; Toro, Urberg, & Heinze, 2004). It is critical that the facilitator be aware of the potential negative consequences of eliciting CCT.

In the case of marijuana use, there was little evidence that the level of exposure to CT and CCT affects marijuana behavior over time (Table 11). Also, exposure to more CCT in Session 2, which involved youth discussing their personal triggers regarding risky sexual behaviors, was associated with increased readiness ( $p < .10$ ) and confidence ( $p < .01$ ) to change marijuana use. A possible reason for this result may be the range of CCT during Session 2 that was associated with major consequences of risky sexual behaviors and high volumes of substance use. Some of the consequences mentioned were a loss of jobs, family, friends, relationships and health.

For drug use including synthetic cannabis, crack, cocaine, heroin, methamphetamine, ecstasy, hallucinogens, inhalants, and over-the-counter medicines, there was some evidence that the level of exposure to CT and CCT affects drug related behavior over time (Table 11). In Session 3, which focused on short and long term pros/cons of substance use, youth exposed to more CT

showed decreased use of drugs ( $p < .10$ ). However, there were mixed results for Session 2, which involved youth discussing their personal triggers regarding risky sexual behavior, in that youth exposed to more CT showed increased use of drugs ( $p < .05$ ) and youth exposed to more CCT showed decreased use of drugs ( $p < .01$ ).

During multiple sessions (Session 1 and Session 2) youth mentioned survival sex as a viable option to obtain basic necessities. While residing in abandoned buildings, outdoor campsites, shelters and other typical places of dwelling for homeless youth, some female participants spoke about the urge to partner for safety and financial reasons. Male participants (in all three phases) admitted to having risky sexual encounters (sharing sexual partners with other people in the group) with females who were seeking temporary shelter. Heavier use of substances is typically associated with survival sex (Greene et al., 1999; Halcón & Lifson, 2004; Walls & Bell, 2011).

The analyses examining change in sexual behaviors and attitudes yielded several interesting results. There was little evidence that the level of exposure to CT and CCT is associated with changes in the total number of partners over time (Table 12). Conversely, in Session 2 and 4, which both focused on strategies to avoid risky behaviors, youth exposed to more CT showed an increase in condom-protective sex acts ( $p < .05$ ) and more exposure to CCT in Session 2 was associated with a decrease in condom-protective sex acts ( $p < .05$ ). A possible explanation for these results is that homeless youth may respond more positively to discussions concerning proactive strategies to avoid future risky situations. For example, many youths expressed CT while discussing sharing their supply of condoms with friends at parties and having a condom accountability buddy. Sexual protective strategies and condom readiness showed evidence of positive effects due to exposure to CT and CCT. In Session 3, youth exposed to more CT showed a marginal increase in sexual protective strategies ( $p < .10$ ) and a significant increase in condom readiness ( $p < .05$ ), whereas youth exposed to more CCT showed a significant decrease in sexual protective strategies ( $p < .05$ ). However, the associations of CT and CCT with condom use self-efficacy were opposite of what was expected. In Session 2, although youth watched a role play exercise about how to discuss condom use with partners and discussed their comfort levels with discussing condom use with partners, youth exposed to more CT showed a marginal decrease in condom self-efficacy ( $p < .10$ ) and youth exposed to more CCT showed a marginal

increase in condom self-efficacy ( $p < .10$ ). During the condom demonstration, many youth who stated confidence in their ability to correctly put on a condom were corrected on their unsafe practices including reverse placement of the condom, and the usage of teeth to open up the package. Being corrected (even in a safe and collaborative environment) may have impacted condom self-efficacy for some youth.

The results of this study are encouraging in that the streamlined parsing and coding method was able to predict some short-term behaviors and attitudes including drug use, protective sex acts, and readiness and confidence in making positive changes in substance use. Being able to predict group-level change is important, as homeless youth are at risk for future negative consequences from their risky behaviors (Anderson et al., 1994; Bailey et al., 1998; Bryan et al., 2007; Rotheram-Borus, Koopman, Haignere, & Davies, 1991; Rotheram-Borus et al., 1996; Rotheram-Borus et al., 2003; Salomonsen-Sautel et al., 2008; Sanders, Lankenau, Jackson-Bloom, & Hathazi, 2008; Sibthorpe et al., 1995; Tucker, Ryan, et al., 2012; Tyler & Johnson, 2006). The streamlined parsing and coding system used in this study was relatively easy to use and may be implemented in community settings. Developing tools for community based research implies the use of practical and feasible training manuals, procedures for preserving the MI spirit throughout intervention delivery, incorporating implementation plans that incorporate solutions to the challenges/barriers of community based settings (Hecht et al., 2005; Klesges, Estabrooks, Dziewaltowski, Bull, & Glasgow, 2005).

### **Limitations of the Study**

Results from this study should be interpreted in light of several limitations. First, similar to previous studies of group level MI (Engle et al., 2010), this study had a small sample size ( $n=68$ ), resulting in low statistical power and a reduced chance of finding statistically significant results. Although bootstrapping was used to improve statistical inference, that technique does not replace the need for a larger sample size to accurately account for variance and to statistically detect the predictive quality of CT and CCT on behaviors and attitudes over time (Efron & Tibshirani, 1986; Raudys & Jain, 1991). Second, approximately 25% of the youth in this study

were not actively engaged in risky substance use or sexual behaviors at baseline. Frequently non-substance users and long term monogamous couples would express a high level of CT while current substance users expressed high levels of CCT. It is unknown if any attitudinal shifts (current substance user expressing CT or nonusers expressing CCT) were made during the course of the MI session. Third, the streamlined parsing/coding system did not have the capabilities to capture individual level client language, precluding the ability to examine the direct effects of each individual's verbal contribution to the group. Having access to affordable and user friendly video MI coding software may lead to a greater range of research applications. Unfortunately, the CACTI software is limited to audio wav files and does not allow for video recordings (Glynn et al., 2012). Fourth, approximately 50% of youth attended less than four AWARE sessions, which resulted in many zero CT and CCT scores per session. This may have decreased the predictive abilities of the streamlined method.

Limitations of the coding approach should also be noted. Although four sessions (9.5 %) were double coded, research standards are approximately 20%. Due to financial constraints, the researcher was responsible for parsing and coding of all of the AWARE sessions. The literature suggests using interclass correlations (ICCs) to calculate coder reliability after every few recordings (Amrhein et al., 2003; Baer et al., 2008; Glynn & Moyers, 2010). ICCs of .75–1.00 are excellent, .60–.74 are good, .40–.59 are fair, and below .40 are poor. Good/excellent scores (ICCs of .75–1.00 are excellent, .60–.74 are good) are desired for reliable outcomes (Cicchetti, 1994). Also, for training purposes it is highly recommended to train several parser/coders simultaneously to minimize cost while possibly improving the quality of the data collection and analysis (Barnett, Spruijt-Metz, et al., 2012).

Despite these weaknesses, the study also had a number of strengths that are worth highlighting. For example, retention of the sample over the 3-month follow-up period was outstanding, despite the transient nature of the homeless youth population.

## **Conclusion and Future Directions**

The results of this study are promising both in terms of developing a streamlined system for parsing and coding CT/CCT during a group-level MI intervention, as well as understanding how CT/CCT in this treatment setting influences individual-level change in substance use- and sexual risk-related attitudes and behaviors. The generalizability of the findings was enhanced by partnering with drop-in centers in two different geographic locations (e.g. Hollywood, Venice Beach/Santa Monica), which served distinct populations of homeless youth. In addition, the majority of youth attended multiple AWARE sessions, with approximately half of them attending all four sessions.

Further research that addresses the limitations of this study is needed to further evaluate the predictive quality of this streamlined approach. In particular, research is needed to explore longer term effects of group level MI interventions for homeless youth, sequential analysis of client and facilitator language, implementation of group level MI research studies and community based research implementation strategies.

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