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Within-session communication patterns predict alcohol treatment outcomes

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Abstract

Background—Within-session client speech is theorized to be a key mechanism of behavior change in motivational interviewing (MI), a directional, client-centered approach to behavior change. Client change talk (CT: speech indicating movement toward changing a problematic health behavior) and sustain talk (ST: speech supporting continuing a problematic health behavior) have each shown relationships with outcomes. However, it may be the case that *patterns* of within-session client speech, rather than counts of client speech, are important for producing change.

Methods—Recorded initial MI/MET psychotherapy sessions from Project MATCH had been previously rated using the Motivational Interviewing Sequential Code for Observing Process Exchange (MI-SCOPE), a mutually exclusive and exhaustive sequential coding system. From these existing data, session conditional probabilities for transitions of interest (the transition from CT to more CT, and the transition from reflections of CT to CT) were analyzed as empirical Bayes estimates of log-normalized odds ratios.

Results—CT frequencies and these log-normalized odds ratios were entered as independent variables into longitudinal generalized estimating equation (GEE) models predicting within-treatment and post-treatment drinking. While all variables were significant predictors of within-treatment drinking, only the CT-CT transition emerged as a significant predictor of decreased drinking after treatment.

Conclusions—The momentum of a client's speech about change during an MI session may be a better predictor of outcome than is a simple frequency count of it. Attending not only to the mere occurrence of CT, but also recognizing the importance of consecutive client statements of CT, may improve treatment outcomes.

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Contributors

All authors have materially participated in the research and/or article preparation. Jon Houck developed the concept and analysis plan and conducted all data analysis. Jon Houck and Theresa Moyers wrote the article. All authors approved the final article.

Portions of these results were included in a symposium presentation at the 2014 annual meeting of the Research Society on Alcoholism.

Keywords

mechanisms of behavior change; psychotherapy process; motivational interviewing; sequential coding

1. INTRODUCTION

Interest in the effects of within-session client speech in motivational interviewing (MI) dates back over twenty years, when Miller, Benefield, and Tonigan (1993) found that a confrontational clinician style was related to significantly more occurrences of resistant client speech, in turn predicting more drinking one year after treatment. Subsequent studies validated this effect in multiple populations and substances of abuse, using both measures of the strength (Amrhein et al., 2003) and frequency of client change language (Apodaca et al., 2014; D'Amico et al., 2015; Moyers et al., 2007; Vader et al., 2010). The MI literature now provides some evidence for a causal chain in MI, in which client change language mediates the relationship between therapist behavior and treatment outcomes (Magill et al., 2014). Such client speech is influenced by the MI clinician (Moyers and Martin, 2006), and clinician training studies have demonstrated that specialized training in MI produces changes not only in therapist speech, but also in the speech of their clients (Miller et al., 2004). This research base suggests that clinicians can be trained to influence the in-session speech of their clients, with subsequent effects on treatment outcomes.

The importance of within-session client speech is not limited to MI. One study of audio recordings from Project MATCH found that client change talk (CT: speech indicating movement toward changing a problematic health behavior) was a significant predictor of drinking outcomes not only in MI, but also in twelve-step facilitation (TSF) and cognitive behavior therapy (CBT) (Moyers et al., 2007). Subsequent studies have found that client speech indicating resistance and change were each associated with specific clinician behaviors and predicted outcomes in CBT for cocaine use (Aharonovich et al., 2008) and for anxiety (Lombardi et al., 2014), suggesting that the strategic elicitation and reinforcement of CT, a theorized mechanism of behavior change in MI (Moyers et al., 2009), could be adopted by other treatment approaches.

The study of relationships between clinician and client speech links to a long tradition in psychotherapy of examining temporal patterns during sessions (Hill et al., 1983). This sequential coding process preserves the temporal sequence of behaviors (speech) during treatment sessions, allowing the researcher to ask "What happened next?" Several research groups have now employed this approach in detailed examinations of MI sessions (Barnett et al., 2014; D'Amico et al., 2015; Houck et al, in press), revealing consistent communication patterns such as the transition from clinician reflections of CT (RefCT) to additional offering of CT by the client (*e.g.*, [You're ready to do this now.][I feel like it's finally time.]) and from client CT to additional client CT (*e.g.*, [I want to change.][I really need to stop drinking now]).

The goal of the present study was to evaluate the relationship between within-session communication patterns and alcohol treatment outcomes using a large sample ($n=118$) of

audio-recorded psychotherapy sessions. All sessions had previously been rated using a mutually exclusive and exhaustive sequential coding system, the Motivational Interviewing Sequential Code for Observing Process Exchanges (MI-SCOPE: Martin et al., 2005). The count of client CT in these sessions has previously been linked to treatment outcomes (Moyers et al., 2009), but the relationship of communication patterns to outcomes has not yet been examined in any MI study. It is possible that these exchanges, more than the simple counts of speech events, will provide a more sophisticated metric for evaluating in-session behavior as it relates to clinical outcomes. Notably, the MI-SCOPE contains two categories of clinician behavior that had never previously been quantified in psychotherapy research: reflections of CT (RefCT) and reflections of sustain talk (RefST). These behaviors are related directly to MI's strategic focus on CT and have since been incorporated into the Motivational Interviewing Skills Code (Houck et al., 2010). Therefore, we hypothesized that both the conditional probability of CT given that a clinician reflection of CT had just occurred (*i.e.*, $P(\text{CT}|\text{RefCT})$) and the conditional probability of client CT given that CT had just occurred (*i.e.*, $P(\text{CT}|\text{CT})$) would each predict alcohol treatment outcomes, beyond the effects of CT frequency alone.

2. METHOD

Data were obtained from the PREMIR study (Moyers et al., 2009), which evaluated a hypothesized causal chain for MI using a sample of recorded psychotherapy interventions and outcome data from the Motivational Enhancement Therapy (MET) condition of Project MATCH. This sample included the initial sessions of 118 clients and involved 13 clinicians. Detailed information on therapist training and supervision in Project MATCH can be found elsewhere (Project MATCH Research Group, 1998). The MI-SCOPE sequential coding system was used to generate counts and transition probabilities. Study procedures were approved by the research institution's Institutional Review Board.

2.1. Participants

One hundred and eighteen sessions were evaluated by the PREMIR study and provided content for this analysis. Participants in this sample had a mean age of 41.1 years (SD 10.8), were primarily male (77.1%) and white (76.3%), and reported substantial daily alcohol use prior to treatment (baseline ml EtOH $M=258.40$, $SD=176.04$).

2.2. PREMIR study coding procedures

After transcription, sessions were evaluated using both the recorded audio and the transcript. In an initial pass, a rater parsed each session into sequential utterances (*i.e.*, thought units) and indicated inaudible utterances. In a second pass, a different rater evaluated each session using the MI-SCOPE, categorizing each sequential utterance into one and only one category. Inter-rater reliabilities for the variables of interest have been reported previously and were in the good-to-excellent range (Moyers et al., 2009).

2.3. Outcome measures

The outcome measure of interest for the present study was the number of drinks per week (DW). This measure was selected to ensure consistency with our prior work (Moyers et al.,

2009). Two periods of interest were examined: within-treatment (weeks 1–5 after enrollment in Project MATCH) and proximal (months 4–9 after enrollment). DW was computed as in the prior study using this dataset as $DDD \times 7 \times (1-PDA)$.

2.4. Statistical analysis

Raw lag-1 transition frequencies were computed from sequential coding data using the General Sequential Querier (GSEQ; Bakeman and Quera, 2012) and converted to log-normalized odds ratios (LNOR). Raw LNOR vary in precision between sessions according to the count of the target sequences within each session. Usage of LNOR that does not address this variability will be flawed (Dagne et al., 2002). Therefore, Empirical Bayes estimates of LNOR were computed from these data in MPlus 7.31 (Muthén and Muthén, 1998–2015) using procedures described by Dagne and colleagues (Dagne et al., 2002), as implemented by Muthén and Asparouhov (2002). LNOR are the natural log transformation of the odds ratio comparing the odds of the transition of interest occurring relative to the odds of all other transitions occurring. See Figure 1 for an illustrative example.

For sequential analysis, the transitions of interest were (CT|RefCT), (CT|CT), (ST|RefST) and (ST|ST). Longitudinal generalized estimating equation (GEE) regression measures were used to examine the effects of transitions and counts on drinking outcomes, using overdispersed Poisson models to address the non-normal distribution of drinking outcomes. Separate GEE overdispersed Poisson models were fit for within-treatment (centered at Week 5) and proximal DW (centered at month 9) using HLM 7.

3. RESULTS

3.1. Sequential analysis

Complete conditional probabilities for this sample have been reported previously (Moyers et al., 2009). Briefly, CT was significantly more likely than expected by chance to follow reflections of CT ($P(CT|RefCT)=.44$), and was also significantly more likely than expected by chance to follow CT ($P(CT|CT)=.24$). Sustain talk was significantly more likely than expected by chance to follow reflections of sustain talk ($P(ST|RefST)=.38$), and was also significantly more likely than expected by chance to follow sustain talk ($P(ST|ST)=.14$). Per session, on average the CT|CT transition occurred 12.9 times ($SD=8.37$), CT|RefCT occurred 1.99 times ($SD=0.86$), ST|ST occurred 1.01 time ($SD=1.46$) and ST|RefST occurred 2.50 times ($SD=1.15$).

3.2. Outcome analysis

In the within-treatment period, significant effects were detected for the CT count, readiness to change, and both the $LNOR(CT|CT)$ transition and the therapist-initiated transition $LNOR(CT|RefCT)$, for both the intercept (DW at week 5) and the linear slope of DW. Both a higher $LNOR(CT|CT)$ (*i.e.*, a greater probability of transitioning from CT in one utterance to CT in the very next utterance; coefficient= -1.783 , $p<.001$), and a higher CT count (coefficient= -0.021 , $p<.001$) were related to lower within-treatment drinking. Missing data lead to the removal of 6 participants; 112 participants were included in this analysis. Complete results are presented in Table 1a.

In the proximal period, significant effects on the DW intercept (Week 9) were detected only for the *LNOR*(CT|CT) transition and for the baseline measure of DW. A higher *LNOR*(CT|CT) (i.e., a greater probability of transitioning from CT in one utterance to CT in the very next utterance) was related to lower proximal drinking (coefficient=-0.879, $p<.05$). Missing data lead to the removal of 7 participants; 111 participants were included in this analysis. Complete results are presented in Table 1b.

4. DISCUSSION

We found that when drinking outcomes (measured as drinks per week) were examined relative to two measures of CT (counts and the conditional probability of CT occurring given that CT had just occurred), both were significant predictors of drinking during the treatment period, but only the conditional probability emerged as a significant predictor during the proximal post-treatment period. Participants who were likely to emit CT immediately after a prior utterance of CT drank with less intensity, both during treatment and during the proximal follow-up period. In the proximal follow-up period, however, the CT count was no longer a significant predictor of drinking.

These findings support the notion that the momentum of a client's speech about change during an MI session is a better predictor of post-treatment outcome than is a simple count of it. When clients offer one instance of CT ("I better stop now before I lose my job") and then follow it immediately with another ("My doctor told me my liver isn't holding up too well either"), better clinical outcomes are more likely. Momentum, and not simply frequency, characterizes more valuable CT. Indeed, in our data, the (CT|CT) transition was the *only* significant predictor of proximal drinking outcomes other than baseline consumption.

On the whole, change language appears to be a robust marker for future behavior change and a valid target for behavioral interventions. Our data indicate that the well-established relationship between client CT and clinical outcomes such as lower problem drinking (Moyers et al., 2009), increased fruit and vegetable consumption (Pirlott et al., 2012) and decreased gambling (Hodgins et al., 2009) may be stronger than analysis using counts alone has suggested. Instead the client's pattern of communication – that is, a tendency to emit CT in bursts rather than in single utterances – may be the more important indicator of long-term behavior change. This novel finding suggests that during interventions for problematic health behaviors, the *momentum* of CT may be a key marker for later behavior change, and one that merits particular attention from the interviewer. Clients who provide utterances of CT in isolation may be less likely to improve than are those who provide clusters or streams of CT. Awareness of this marker for later change should lead interviewers to attend to their behaviors that precede CT. If CT is itself a mechanism in MI, and not merely a marker for other change processes, then attending to CT is an important first step toward eventual manipulation of it.

Our data suggest that if clinicians wish to increase the momentum of change talk during MI sessions, urgent reinforcement of CT may not be the ideal strategy. Instead, it may be more important to permit clients who are already offering CT to speak further, allowing an

opportunity for more CT. While reflections of CT are desirable, it appears that a client's consecutive utterances of CT should not be interrupted in order to provide a reflection. Instead, strategic interventions like reflections of CT and questions querying CT may be held in reserve as long as the desirable momentum of CT is sustained. Finally, these results provide additional support for an emphasis on the recognition and selective reinforcement of CT rather than ST in the training and dissemination of motivational interviewing.

However, it is important to note that our data are correlational, meaning that we cannot know whether the occurrence of this transition is causing improved treatment outcomes, or is simply indicating other processes that actually account for these desirable changes. Further, this is the first MI study to examine the relationship between communication patterns and treatment outcomes – that is, all prior clinical and translational studies have examined only single CT utterances (e.g., Houck et al., 2013). To increase confidence in our results, future studies should assess both CT counts and these CT bursts.

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Conflict of Interest

Theresa Moyers is a trainer in Motivational Interviewing who is occasionally compensated for the training. Jon Houck is a trainer in Motivational Interviewing coding systems who is occasionally compensated for the training.

Role of Funding Source

None of the funding sources had any role in study design, collection, analysis, or interpretation of data.

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Highlights

- We used sequential coding to test communication patterns in motivational interviewing
- We examined 118 initial sessions of Motivational Enhancement Therapy
- Clients who emitted change talk after a prior change talk statement, drank less after treatment
- Change talk counts were not a significant predictor of post-treatment drinking outcomes
- Communication patterns may be a better target in interventions to reduce drinking

		Target:	
		Yes	No
Given:	Yes	a	b
	No	c	d

$$\text{Odds ratio} = \frac{a/b}{c/d}$$

	CT	all other	Total
RefCT	10	15	25
all other	4	31	35
Total	14	36	60

$$\text{Odds ratio} = \frac{10/15}{4/31} = \frac{0.667}{0.129} = 5.167$$

$$\text{Log odds} = \ln(5.167) = 1.64$$

Fig. 1.

Illustrative example of odds ratio for the occurrence of a target behavior after a given behavior.

Table 1

Longitudinal generalized estimating equation model of change talk counts, the RefCT-CT transition, and the CT-CT transition on outcomes

a. Within-treatment drinking					
Fixed effect	Coeff	SE	Event rate ratio	95% CI	t ratio
Intercept of DW					
Change talk count	-0.021	0.001	0.979	0.977,0.981	-21.926**
EB <i>LNOR</i> (CT CT)	-1.783	0.075	0.168	0.145,0.195	-23.708**
EB <i>LNOR</i> (CT RefCT)	-1.439	0.062	0.237	0.209,0.268	-23.108**
Readiness to change	-0.665	0.023	0.515	0.492,0.538	-28.986**
Linear slope of DW					
Change talk count	-0.014	0.001	0.986	0.984,0.988	-16.588**
EB <i>LNOR</i> (CT CT)	-0.632	0.067	0.531	0.465,0.607	-9.428**
EB <i>LNOR</i> (CT RefCT)	-0.652	0.058	0.521	0.465,0.584	-11.291**
Readiness to change	-0.421	0.019	0.657	0.633,0.681	-22.711**
b. Post-treatment drinking					
Fixed effect	Coeff	SE	Event rate ratio	95% CI	t ratio
Intercept of DW					
Baseline drinking	0.009	0.002	1.009	1.006,1.012	5.819**
Change talk count	-0.006	0.005	0.994	0.984,1.004	-1.152
EB <i>LNOR</i> (CT CT)	-0.879	0.441	0.414	0.173,0.995	-1.992*
EB <i>LNOR</i> (CT RefCT)	0.201	0.276	1.222	0.707,2.114	0.729
Readiness to change	-0.077	0.065	0.926	0.814,1.052	-1.193
Linear slope of DW					
Baseline drinking	0.001	0.000	1.001	1.001,1.002	7.696**
Change talk count	0.000	0.001	1.000	0.998,1.002	0.192
EB <i>LNOR</i> (CT CT)	0.066	0.049	1.068	0.969,1.177	1.344
EB <i>LNOR</i> (CT RefCT)	0.060	0.040	1.062	0.982,1.149	1.523

b. Post-treatment drinking

Fixed effect	Coeff	SE	Event rate ratio	95% CI	t ratio
Readiness to change	0.049	0.013	1.050	1.023,1.078	3.695**

Note: Coefficients and event rate ratios are unstandardized. CT=change talk; RefCT=reflections of CT; EB = empirical Bayes estimate; $L NOR(CT|CT) = \log\text{-normalized odds ratio for the transition to CT given that CT has just occurred}$; $L NOR(CT|RefCT) = \log\text{-normalized odds ratio for the transition to CT given that a RefCT has just occurred}$.

* = $p < .05$
** = $p < .001$