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The Structure of Client Language and Drinking Outcomes in Project MATCH

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Abstract

Client language during Motivational Interviewing interventions is an important predictor of drinking outcomes, but there are inconsistencies in the literature regarding what aspects of client language are most predictive. We characterized the structure of client language by factor analyzing frequency counts of several categories of client speech. The results provide limited support for a model proposed by Miller et al. (2006) and Amrhein et al. (2003) but with some important differences. While Amrhein et al. (2003) found that only increasing strength in client commitment language predicted behavior change, the current study revealed that client language preparatory to commitment predicted drinking outcomes.

Keywords

motivational interviewing; alcohol; treatment; outcome; change talk

Client language is increasingly recognized as an important predictor of clinical outcomes for motivational interviewing. Evidence is accumulating for a predictive role for particular elements of client speech in behavioral change (Amrhein, Miller, Yahne, Palmer, & Fulcher, 2003; Hodgins, Ching, & McEwin, 2009; Moyers, Martin, Christopher, Houck, Tonigan, & Amrhein, 2007; Gaume, Gmel, & Daeppen, 2008). Specifically, language that the client offers during an MI treatment session weighing in favor of changing a problematic behavior, typically substance abuse, predicts post treatment drug and alcohol use, even when the level

of initial motivation, severity of dependence, and efficacy for change have been accounted for (Moyers, Martin, Houck, Christopher, & Tonigan, 2009).

Miller and Rollnick (1991; 2002) have drawn upon self-perception theory (Bem, 1967) to explain how these client statements for or against change may influence client motivation in MI sessions. If the client argues in favor of change (change talk, CT), the client perceives that what he or she is arguing for must be what he or she believes, thereby increasing motivation for change. In other words, "the person literally talks himself or herself into change." (Miller & Rollnick, 2004, p.300). Alternatively, when the client argues against change (counter-change talk, CCT), their perception of the self making this argument lowers motivation to change. This implies that client speech that favors change (CT) should predict favorable outcomes, while client speech supporting the target behavior (CCT) should predict maintaining the status quo. These predicted relationships between CT, CCT, and outcome have now been observed several times, but with a number of inconsistencies. Miller, Benefield and Tonigan (1993) found that client verbalizations of resistance to change, or CCT, predicted client drinking outcome assessed 12 months after therapy. In the same study, however, Miller et al. failed to find a significant relationship between outcome and CT. Moyers et al. (2007) found that both CT and CCT independently predicted drinking behavior averaged over a period of 10-15 months after therapy.

In an influential study, Amrhein et al. (2003) conducted an analysis of client language in an RCT for MI with drug using clients. Based on *a priori* hypotheses concerning the nature of social commitments, Amrhein et al. (2003) conceptualized several sub-categories of change talk, including Commitment, Desire, Ability, Need, Readiness, and Reasons. In addition to categorizing certain acts of client speech, coders rated the strength (i.e., intensity) of CT and CCT utterances. They found that drug use outcomes were associated with the pattern of these strength ratings during MI treatment sessions. Specifically, they found that increasing strength of Commitment statements predicted more favorable drug use outcomes. Based largely upon this research, a model of client speech was developed in which expressions of change talk categorized as statements of Desire, Ability, Reasons, and Need, collectively termed "preparatory language," should lead to statements of commitment to change a problematic behavior. These commitment statements should then predict post-treatment behavior (Miller, Moyers, Amrhein, & Rollnick, 2006). Thus, preparatory language and commitment language are seen as two distinct constructs. The clinical implications of this model are straightforward, that is, clinicians should hesitate to move forward with action strategies (called Phase II in MI) until commitment language is strong, regardless of how many statements of desire, ability, reason, and need have been offered.

Research subsequent to the original Amrhein study has been consistent in supporting the value of change talk in predicting clinical outcomes in MI, although evidence for the dominance of commitment language has been mixed. For example, Gaume, Gmel, and Daeppen (2008) found no link between commitment language and drinking outcomes using the Motivational Interviewing Skills Code (MISC) 2.0 (Miller, Moyers, Ernst, & Amrhein, 2003), but did find an association between drinking outcomes and client statements of ability to change. Similarly, Baer et al. (2008) found that client statements about reasons to change were associated with reductions in substance use in homeless adolescents, though commitment language was not. Moyers et al. (2007) found that a single, generic change talk category predicted drinking outcomes in a secondary analysis of Project MATCH outcomes, without reference to commitment language. On the other hand, Hodgins, Ching, and McEwen (2009) found that commitment language predicted gambling outcomes in an RCT using MI, while preparatory language did not.

The consistent finding of a relationship between client speech and outcome is promising, but the inconsistencies in what aspect of speech is most predictive points to the need for a more complete understanding of the structure of client verbalizations. Does client speech naturally cleave into preparatory and commitment categories as suggested by Amrhein et al. (2003), or would clinicians be better advised to attend to any and all statements in favor of change when considering whether to move forward to action planning in MI sessions?

This study attempts to inform this question by examining the underlying structure in a large sample of client speech drawn from Motivational Enhancement Therapy sessions in Project MATCH (Project MATCH Research Group, 1997). Therapy sessions were recorded and evaluated using the SCOPE (Martin et al, 2006). The SCOPE was developed in response to a perceived need to investigate the dynamics of therapy sessions (Moyers & Martin, 2006). SCOPE combines elements of the MISC 1.0, particularly codes for therapist speech, and also incorporates multiple categories of client preparatory and commitment language using definitions similar to those of Amrhein et al. (2003). The SCOPE coding system also includes a procedure for recording the serial order of client and therapist statements so that sequential patterns can be analyzed statistically. Results of the sequential analysis of client-counselor interactions for this project are given elsewhere (Moyers & Martin, 2006; Moyers et al., 2009). This paper, however, focuses on the frequency counts of client speech coded from these tapes. Because multiple categories of both CT and CCT are measured, these frequency counts provide an opportunity to investigate the structure of change talk. By treating each category frequency as an imperfect indicator of one or more latent constructs, the underlying structure of those constructs can be estimated using factor analysis. Thus even if the categories do not perfectly coincide with the actual psychological sources of the speech events, so long as each category is distinct enough to blend these underlying factors in a different way (i.e., to be a different linear combination of underlying factors), and broad enough to capture several of the underlying factors that contribute to client motivational speech, factor analysis should give some indication of this latent structure. To this end we factor analyzed frequency counts of client speech from 118 Project MATCH interviews from the data set reported in Moyers et al. (2009). For the purposes of this analysis, we restricted ourselves to the first session of the MET condition from Project MATCH (Project MATCH Research Group, 1997).

We reasoned that if preparatory language and commitment statements are distinct constructs as hypothesized by Miller et al. (2006), we would expect two factors to explain client language both for and against change. One factor would include commitment to change and commitment to maintain the status quo. A second factor would be expected to account for statements of Desire, Ability, Reasons, or Need to change or maintain the target behavior. A third factor would be expected to account for neutral client speech (i.e., unrelated to the target behavior), coded in SCOPE as Follow (a client utterance unrelated to the target behavior) and Ask (client asks a question). We would also expect the commitment factor, but not the preparatory language or neutral factors, to predict drinking outcomes.

Methods

Participants

The data selected for this analysis were from 118 first-session tapes from the MI condition of Project MATCH (Project MATCH Research Group, 1997). We restricted this analysis to first-session tapes for several reasons. First, we restricted the analysis to a single session because the effect of sessions on client and therapist behavior is largely unknown and beyond the scope of this analysis. The first session was chosen because it represented the largest sample of sessions available to us, and because in the past frequency counts of initial sessions have been found to correlate with outcome using other coding instruments (Moyers

et al., 2007) and the SCOPE (Moyers et al., 2009). Details of the overall sample are given elsewhere (Project MATCH Research Group, 1997). In the subsample reported here, 91 clients (77%) were male, 86 (72.9%) were White, 11 (9.3%) were African American, 20 (16.9%) were Hispanic, and 1 (0.8%) was of another ethnicity. The mean age was 40.75 (range 21-74), and the mean number of years of education was 13.53 (range 8 – 20). All study and consent procedures were reviewed and approved by the human research Institutional Review Board of the University of New Mexico.

Coding

Therapy sessions were coded using the SCOPE (Martin et al., 2005). The manual for SCOPE is available from http://casaa.unm.edu/download/scope.pdf. The coding process has been described in detail elsewhere (Moyers & Martin, 2006; Moyers et al., 2009). Briefly, audio recordings of therapy sessions were transcribed and then assessed in two separate passes. Coders both listened to the recording and read along with the transcript for both passes, marking their codes directly in the transcript. In the first pass the recording was parsed into utterances, which were defined as expressions of a single idea. In the second pass, each utterance was assigned a single category code, based on definitions found in the coding manual. Typically each pass was performed by a different coder. There were 16 categories of client speech. These categories were Follow and Ask (described above) to describe speech unrelated to the target behavior, and Desire, Ability, Reason, Need, Taking Steps, Commit, or Other. To specify direction (i.e., reflecting movement toward change or the status quo), these categories were followed by a '+' or '-' symbol. For example, Reason+ would refer to a reason to change, while Reason- would denote a reason to maintain the target behavior.

Data analysis

This is a secondary analysis of data reported elsewhere (Moyers & Martin, 2006; Moyers et al., 2009). Frequency counts of client speech as coded by SCOPE were factor analyzed, using principal components extraction, a retention criterion of 1 eigenvalue, and varimax rotation. Principal components extraction was chosen because it includes variance unique to each measured variable (Harris, 1975; Johnson & Wichern, 1982), and there was no evidence of large differences in communalities among the measured variables (Harris, 1975, pg. 223), which ranged from 0.526-0.75. This implies that methods that exclude unique variance would not improve the solution, but would degrade the relationship between empirical data and factor scores (Harris, 1975, pp. 222-223). Varimax rotation (Kaiser, 1958) was implemented because it tends to result in more interpretable factors than the unrotated (principle component orientation) solution, but will be highly similar to the unrotated solution if the observed correlation matrix is caused predominantly by a single latent variable.

Drinking outcome measures have been described in detail elsewhere (Project MATCH Research Group, 1997). Briefly, we used proximal and distal measures of percent days abstinent (PDA) and drinks per drinking day (DDD). In Project MATCH, Percent Days Abstinent (PDA) was assessed using the Form-90. The Form-90 incorporates memory cues from time-line follow-back procedures with drinking pattern estimation methods from the Comprehensive Drinker Profile (Miller & Del Boca, 1994; Miller & Marlatt, 1984). These measures are averaged across follow-up assessments. The proximal measures are averaged across assessments conducted at months 4-9 post-therapy, while the distal measures are averaged across months 10-15 post-therapy. To improve the normality of the distributions, PDA was arcsine transformed and DDD was square-root transformed. Two-step hierarchical multiple regressions were used to predict these criterion variables. This was done to assess whether client speech predicted unique variance in outcome in addition to known predictors.

In the first step of each regression model, a baseline measurement of the criterion variable, as well as Alcohol Involvement (AIM) as measured by a third-order scale from the Alcohol Use Inventory (Wanberg, Horn, & Foster, 1975), self-efficacy as measured by the Alcohol Abstinence Self-Efficacy scale (AASE: DiClemente, Carbonari, Montgomery, & Hughes, 1994), and readiness to change were entered. Readiness to change was derived from the University of Rhode Island Chance Assessment Scale (URICA: McCounnaughy, Prochaska, & Velicer, 1983) by summing that instrument's Contemplation, Action, and Maintenance subscales and subtracting the Precontemplation subscale score (Carbonari, DiClemente, & Zweben, 1994; Connors, Tonigan, & Miller, 2001). In the second step, the six factors of the FA were entered.

Results

Details regarding inter-rater agreement of the SCOPE codes used here are given in detail elsewhere (Moyers et al., 2009). Briefly, agreement for the frequency counts of client speech used here were assessed with intraclass correlation coefficients (Shrout & Fleiss, 1979), and ranged from 0.620 (Commit-) to 0.993 (Ask). Other-, arguments in favor of maintaining the target behavior that were not classifiable elsewhere, was removed from the factor analysis because its ICC was 0.229, unacceptably low (Cicchetti, 1994).

The correlation matrix for client speech is given in Table 1. The table is provided for readers who may be interested in exploring other factor models of the data. Factor loadings are given in Table 2. The 16 categories of client speech were characterized by six factors with eigenvalues > 1.0 explaining 64.85 % of the variance. Variables loading most heavily on factor one included Commit-, Desire-, Reasons-, and Need-. We suggest that this factor be interpreted as reflecting motivation to maintain the status quo. Factor two, which included both Steps+ and Steps-, as well as Need-, might reflect actions related to drinking behavior generally, rather than movement in a specific direction toward or away from change. Factor three included Desire+, Reason+, Need+, and Other+ speech. We interpret this as reflecting preparatory language as described by Amrhein et al. (2003), but without the Ability category. Instead, Ability+ was split between the next two factors. Factor four includes Commit+ and Ability+, as well as Follow. We suggest that this factor reflects commitment to change. Factor five has strong positive loadings for both Ability+ and Ability-. This factor may reflect ambivalence on the part of many clients, who tend to express concurrently their ability to change and the difficulty they anticipate in doing so. The final factor is straightforward, with Follow and Ask loading most heavily. This factor likely reflects the client's general participation in the session.

The hierarchical regressions of DDD were not significant. The hierarchical regression of proximal PDA on baseline measures and factors is given in Table 3. The first step, which included baseline PDA, AIM, AASE, and Readiness, was significant, $F(4, 93) = 5.655$, $p<0.0005$. Only baseline PDA was a significant predictor of proximal PDA. The change in R^2 at the second step was not statistically significant, $\Delta R^2 = 0.097$, $p = 0.077$, but Factor 2 was nevertheless a significant predictor of proximal PDA. The model overall was significant, $F(10,87) = 3.59$, $p = 0.001$, adjusted $R^2 = 0.21$, SE = 0.39.

The regression of distal PDA is given in Table 4. The model at the first step was significant, $F(4,97) = 5.44$, $p = 0.001$. Only baseline PDA was a significant predictor. The change in R^2 at the second step was significant, $\Delta R^2 = .112$, $F(6,87) = 2.32$, $p = 0.04$, as was the overall model, $F(10,87) = 3.75$, $p <0.0005$, adjusted $R^2 = 0.22$, SE = 0.43. Factor 3 and Factor 5 were significant predictors, with a positive and negative slope respectively.

Discussion

The results of the factor analysis provide limited support for the two construct theory of client speech proposed by Miller et al. (2006). There were factors that could be interpreted as preparatory language and commitment to change, although categories of counter-change talk did not cleave so cleanly between preparatory and commitment categories. Additional factors indicate that more than two constructs are necessary to account for client speech related to change.

Frequency of Desire+, Reasons+, Need+, and Other+ loaded positively on factor three, the Preparatory Language Factor. This factor is largely consistent with the two construct model and has a positive slope with distal PDA, indicating that as clients express more of these preparatory statements, PDA increases. However, client language about ability to change did not load onto this factor. Instead, the frequency of language regarding the ability to change appears to reflect two independent factors. Ability+ statements were primarily associated with Factor 4 (Commit+, Ability+). This close link between commitment to change and perceived (or at least verbalized) ability to change may reflect an increased likelihood to commit to change only with a sufficiently high confidence in one's ability to be successful.

Client speech categorized as Follow also loaded on Factor Four, although not as heavily as it loaded on Factor 6 (Follow, Ask). The frequency of this category, which is explicitly defined as speech not related to the target behavior or neutral with respect to the target behavior, will reflect several characteristics of the client, therapist and situation, including trait talkativeness, therapeutic alliance, and the degree to which clients are willing to follow the topical lead of the therapist. Any one of these (and perhaps others), alone or in combination, could explain why Follow would load on the same factor as Commit+ and Ability+. It could be that high levels of alliance are globally associated with overall talkativeness in a session but selectively associated with verbalizations of commitment and ability to change. Perhaps more simply, it could be that clients who have already committed to changing the target behavior (and thus will emit more Commit+ statements) also tend to be more talkative during therapy, and thus the relationship between Follow and Commit+ merely reflects this relationship.

Factor five appears to reflect a more general concept of ability, in that both Ability+ and Ability- loaded positively. In other words, clients who expressed an ability to change also tended to express doubts or reservations about their ability to change. The interpretation of this factor is not necessarily straightforward. Ability- loaded most heavily on Factor 5 and the slope of the relationship between it and distal PDA was significantly negative, meaning that higher scores on this factor predicted fewer abstinent days. However, because Ability+ also loaded positively on Factor 5, it does not appear to indicate only a perceived inability to change. It may instead reflect ambivalence about one's ability to change, with poor outcome associated with high ambivalence. Within motivational interviewing sessions, then, clinicians should not be surprised to hear clients expressing both confidence and doubt about a change.

Similarly, factor two was composed of Steps+, Steps-, and Need-. This factor is somewhat puzzling. Steps are defined in the SCOPE as reports of active changes that a person has made in their lives to either support the target behavior or change it. For example, a person might start taking aspirin before going to bed to avoid a hangover (Steps-) or change their driving patterns to avoid a tempting bar (Steps+). The fact that the frequency of these categories is positively correlated is therefore an interesting finding in itself and merits further investigation. The combination of these statements with Need-, a stated lack of need to change the target behavior, may be an indicator of a particular stage of change. Once the

target behavior has been changed, for example, one would not expect to continue hearing Need+ statements. Therefore, this factor may reflect variation between clients in the current state of their attempts to change their target behavior, with those who have successfully reduced or eliminated the behavior commenting on steps taken, both forward and back, and lacking in statements reflecting a current, immediate need for change. Those who have not yet successfully begun or made the change, on the other hand, may not report concrete steps toward or away from change, but express more Need+ statements reflecting their recognition that a current need to change exists. This interpretation is consistent with the relationship between this factor and proximal PDA. Those further along the continuum of change at the first therapy session would be high on factor two, and would achieve higher levels of PDA in the first few months after therapy, while those who were still in early stages of change would be low on factor two, and might well take more time to achieve abstinence, if they ever do. The fact that factor two predicts unique variance in proximal PDA in the presence of baseline PDA as a predictor strengthens the interpretation that this factor reflects the process of change and not only current behavior. The fact that it did not predict distal PDA ($p = 0.078$) may reflect a real reduction in influence over time, or merely measurement error in the presence of marginal statistical power.

Three of the derived factors predicted drinking outcomes as measured by percent days abstinent (PDA). Factor two (Steps+, Steps-, Need-) was positively associated with Proximal PDA, while factor three (Desire+, Reason+, Need+, Other+) was positively associated with Distal PDA. In contrast, factor five (Ability+,Ability-) was negatively associated with Distal PDA. The association of the Preparatory Language factor (factor three) with outcome is consistent with the result of Baer et al. (2008), who found that statements of reasons to change were positively associated with changes in substance use in adolescents. In addition, both Baer et al. (2008) and Gaume et al. (2008) found that statements of ability/inability to change were associated with outcome, consistent with our finding of a relationship between the Ability factor (factor five) and outcome.

The implication of these results for clinicians using MI is that rather than a strict focus on the strength of client language, clinicians may adopt a broad focus on the general concept of change talk and how prevalent it is in the MI session, at least within the first therapy session. Our data suggest that clinicians may not need to differentiate between categories of change talk "on the fly" during treatment sessions, but can respond to any offer of change talk on the part of the client without the need for belabored examination. Additional clinician attention is warranted only when counterchange talk occurs more often than does change talk, particularly within the categories of Ability and Steps. If replicated, this result will also call into question the concept of two distinct phases of therapy, a preparatory followed by an action phase. However, we hasten to add that our sample was restricted to first sessions, and so these results may not generalize beyond an initial session. In some cases the action phase may not emerge until later therapy sessions, and commitment language during those sessions may well predict outcome as well or better than preparatory language did in the current report.

Despite limited support for the two construct model, our data present a few surprises that merit some discussion. First, client language about ability to change does not reflect the same factor as statements of desire, need and reasons to change, contrary to the predictions of the two construct model. The closest relationship is found between ability statements and the factor reflecting commitment to change.

Perhaps more important than the number of factors, the pattern of predictive factors is at odds with expectations from the two construct model. While the Preparatory Language factor (factor three) itself is somewhat consistent with the two construct model, the fact that

it accounts for unique variance in outcome in the presence of Commitment (factor four) is not. The Steps factor is positively associated with proximal PDA, and the Ability factor is negatively associated with distal PDA. Both of these factors appear to represent a dichotomy, with the direction of relationship with outcome determined by the valence of the more frequent utterance within the category. For example, in the Taking Steps factor, there were nearly three times as many Taking Steps+ utterances as there were Taking Steps-, and this factor was positively associated with proximal PDA. In contrast, in the Ability factor there were nearly twice as many Ability-utterances as there were Ability+, and this factor was negatively associated with distal PDA.

There are several possible reasons for the discrepancy between our findings and the two construct model. The first is that the coding definitions within a two construct model differ in at least one important way from those of the SCOPE, as evidenced by the examples given in their report. Specifically, many instances that Amrhein et al. (2003) would classify as Commit would be coded in SCOPE as Reasons. Therefore it is likely that a great many of the statements that Amrhein et al. classified as Commit are here categorized as Reason+ or Reason-. Other possible reasons for the discrepancy include the fact that the samples, the therapy protocols, and the coding and analysis methods of the studies are different.

Another important difference between the SCOPE and the two construct model is in how frequencies are counted. Amrhein et al. (2003) collapsed across the change-status quo dimension, so that the frequency of a category like Commit would include both "I am going to change" and "I am not going to change". It is this frequency count that failed to discriminate between outcome clusters in their report. The factor structure found here indicates why frequency might not predict behavioral outcomes when collapsed across this dimension. Verbalizations of CT and CCT in general load on different factors, indicating that while conceptually (and statistically) related, CT and CCT are empirically distinguishable.

There are several limitations to the current study. The selection of therapy sessions for coding was not random, but depended instead on the willingness of individual IRB committees at Project MATCH sites to approve a secondary analysis (Moyers et al., 2009), and this may limit our ability to generalize to the population of people treated for substance abuse. This was a secondary analysis of data in which client speech was known to predict outcome (Moyers et al., 2009), which may have led to some degree of alpha inflation. The fact that strength of utterances was not coded limits our ability to compare results directly with others who do so (e.g., Amrhein et al., 2003; Gaume et al., 2008), although it simultaneously extends our knowledge to another measure of client speech that should be equally well covered by the theoretical constructs in question. The inability of the factors to predict DDD indicates that they likely cannot predict all outcome measures with equal power, and may suggest limited construct validity. Despite these limitations, the results of this study provide strong evidence that two constructs are not sufficient to account for client speech related to change, and some indication of what a more adequate framework for understanding client speech might look like. Further analyses of client language in studies of similar populations with similar coding systems will be an important addition to the literature on the mechanisms of effectiveness in MI. Factor 5 (Ability) is particularly intriguing, as it is conceptually related to self-efficacy and autonomy, concepts considered critical to MI effectiveness (Miller & Rollnick, 2002) and indeed to the wider issue of intrinsic motivation (Deci & Ryan, 1985; Ryan & Deci, 2000). We believe that uncovering these mechanisms is worthwhile, as they should lead to greater efficacy and effectiveness of MI as well as improved efficiency in its delivery.

Acknowledgments

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Table 1

Correlations among CT and CCT frequencies

	C+	D+	A+	R+	N+	TS+	O+	C-	D-	A-	R-	N-
D+	0.088											
A+	.446(**)	.238(**)										
R+	.302(*)	.261(**)	.204(*)									
N+	0.104	.230(*)	0.01	.217(*)								
TS +	0.066	0.008	0.169	0.158	0.145							
O+	.254(**)	.265(**)	.400(**)	.332(**)	.202(*)	.235(*)						
C-	.290(**)	0.05	0.076	.194(*)	0.006	0.18	.228(*)					
D-	0.122	0.053	0.06	.181(*)	0.075	.212(*)	0.17	.388(**)				
A-	.240(**)	.287(**)	.412(**)	.192(*)	-0.005	0.057	.319(**)	.212(*)	0.145			
R-	-0.077	0.073	0.169	.240(**)	0.039	.208(*)	.214(*)	.250(**)	.327(**)	.242(*)		
N-	0.126	0.025	.239(**)	0.052	0.115	.317(**)	.252(**)	.362(**)	.279(**)	0.103	.261(**)	
TS-	0.001	0.019	0.063	0.096	0.13	.310(**)	0.118	-0.021	0.034	0.121	.201(*)	.198(*)

Note. "+" = in favor of change, "-" = in favor of the status quo, A = Ability, C = Commit, D = Desire, F = Follow, N = Need, O = Other, R = Reason, ST = Taking Steps.

*
p < 0.05

**
p < 0.01

Table 2

Factor loadings of client speech variables

	F1	F2	F3	F4	F5	F6
C-	**0.788**	-0.009	0.031	0.231	0.044	0.029
D-	**0.768**	0.070	0.109	-0.060	0.072	-0.050
R-	**0.477**	0.339	0.025	-0.338	0.396	0.273
TS-	-0.146	**0.747**	0.078	-0.142	0.150	-0.015
TS+	0.204	**0.710**	0.102	0.111	-0.034	-0.099
N-	**0.471**	**0.525**	-0.032	0.201	-0.017	0.029
N+	-0.016	0.234	**0.764**	0.039	-0.298	0.016
R+	0.238	0.014	**0.607**	0.147	0.259	-0.109
D+	-0.065	-0.089	**0.592**	-0.008	0.387	0.214
O+	0.178	0.253	**0.406**	0.293	0.355	0.149
C+	0.158	-0.062	0.191	**0.813**	0.104	0.026
A+	-0.038	0.225	0.034	**0.607**	**0.554**	0.102
A-	0.118	0.019	0.095	0.130	**0.817**	0.007
ASK	-0.025	-0.180	0.202	-0.103	0.084	**0.812**
F	0.054	0.131	-0.200	**0.455**	-0.001	**0.695**

Note. Factors are principal components in varimax orientation. Six factors accounted for 64.85% of the variance in client speech. Factor loadings >0.4 are in bold type to facilitate interpretation. "+" = in favor of change, "-" = in favor of the status quo, A = Ability, C = Commit, D = Desire, F = Follow, N = Need, O = Other, R = Reason, ST = Taking Steps.

Table 3

Multiple regression of proximal PDA on baseline PDA and factors

Predictor		Step 1			Step 2		
	beta	t	p	beta	t	p
Intercept		0.478	0.634		0.379	0.706
baseline PDA	0.349	3.723	<0.0005	0.363	3.868	<0.0005
AI	0.031	0.301	0.764	0.098	0.916	0.362
AASA_INT	0.152	1.585	0.116	0.187	1.924	0.058
Readiness	0.191	1.942	0.055	0.157	1.593	0.115
F1 (CCT)				-0.064	-0.66	0.511
F2 (Steps)				0.199	2.165	0.033
F3 (Prep)				0.163	1.77	0.08
F4 (Commitment)				0.083	0.889	0.376
F5 (Ability)				-0.134	-1.425	0.158
F6 (Following)				-0.005	-0.057	0.954

Note. PDA = percent days abstinent, CCT = counter-change talk, Prep = preparatory language.

Table 4

Multiple regression of distal PDA on baseline PDA and factors

Predictor	Step 1			Step 2		
	beta	**t**	**p**	**beta**	**t**	**p**
Intercept		1.285	0.202		0.851	0.397
baseline PDA	0.403	4.285	<0.0005	0.417	4.468	<0.0005
AI	0.123	1.204	0.232	0.165	1.555	0.124
AASA_INT	0.129		0.186	0.157	1.624	0.108
Readiness	0.029	0.29	0.773	0.042	0.43	0.668
F1 (CCT)				0.042	0.441	0.66
F2 (Steps)				0.163	1.783	0.078
F3 (Prep)				0.201	2.201	0.03
F4 (Commitment)				-0.057	-0.621	0.536
F5 (Ability)				-0.21	-2.243	0.027
F6 (Following)				0.001	0.013	0.989

Note. PDA = percent days abstinent, CCT = counter-change talk, Prep = preparatory language.