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The relationship between in-session commitment language and daily self-reported commitment to reduce or abstain from drinking[☆]



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ABSTRACT

Background: Motivational interviewing is hypothesized to operate by enhancing a client's internal motivation to change. Past research operationalizes this process by measuring in-session statements for change (i.e., change talk), yet relationships between change talk and other measures of motivation have yet to be substantiated. This study tested whether in-session change talk predicted subsequent reports of commitment to abstain or moderate drinking assessed via ecological momentary assessment (EMA), and explored each of their contributions to drinking outcomes.

Method: Secondary data analysis was performed on data from 48 study participants who received therapy within a randomized controlled trial testing mechanisms of actions of MI. Multilevel models were used to test whether in-session commitment statements (strength, frequency, and slope of strength) made in two therapy sessions predicted subsequent daily reports of commitment to abstain or not drink heavily and drinking (21 days of data) in the weeks following each respective session.

Results: A weak, negative relationship between in-session commitment and average daily commitment to abstain emerged. No relationship between in-session statements and average daily commitment to not drink heavily emerged. Only EMA commitment predicted drinking outcome. Post hoc analyses demonstrate a moderating impact of EMA commitment to abstain on in-session commitment strength: low pre-treatment commitment to abstain and increasing commitment strength across a session yielded the greatest drink reduction.

Conclusion: In-session change talk and EMA commitment may represent distinct aspects of motivation, yet their interaction appears important to treatment prognoses. Commitment to abstain may be important for treatment selection and successful drink reduction.

1. Introduction

Motivational Interviewing (MI) is one of the most widely disseminated and utilized evidence based practices within treatment for alcohol use disorder (AUD; Miller & Rose, 2009). While MI is demonstrated to work as effectively as other bona fide psychosocial interventions, it often achieves successful behavior change outcomes in fewer sessions. In addition, it is especially useful in facilitating treatment initiation and engagement and as a compliment to other treatments, making it a particularly valuable tool in the AUD treatment toolkit.

Despite this achievement, like other established treatments for AUD, MI is only modestly effective. Efforts to better understand and improve MI have focused on identifying its active ingredients and mechanisms of action, with a focus on increasing motivation as MI's unique effect. Miller and Rose (2009) proposed a theory of MI's active ingredients: a relational component, which included a Rogerian, client-centered approach (e.g., empathy, unconditional positive regard, non-judgmental stance), and a technical component, specifically the selective evocation and reinforcement of change talk. Miller and Rose hypothesized that it was these two active ingredients that increased motivation (operationalized by increased change talk) and subsequently better

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treatment outcomes, in this case, reduced drinking.

1.1. Motivation operationalized

The construct of motivation is deceptively complex, and as a result, multiple and distinct measures of motivation have proliferated within the AUD literature. Motivation is often defined as a readiness for, desire, reason, need, intention or commitment to change (DiClemente, Schlundt, & Gemmell, 2004), which has inherent cross over with other important constructs related to behavior change, such as self-efficacy (Beauchamp, 2016). Historically, two of the most common ways motivation is measured is via readiness to change, often using traditional, global self-report questionnaires (Apodaca & Longabaugh, 2009), and in-session client speech (e.g., change talk, number of utterances regarding commitment to change) (e.g., Amrhein, Miller, Yahne, Palmer, & Fulcher, 2003; Moyers et al., 2007; Vader, Walters, Prabhu, Houck, & Field, 2010). Although both attempt to measure motivation, there is limited evidence of an association between readiness to change and client change talk (Hallgren & Moyers, 2011) or commitment to abstinence (Blanchard, Morgenstern, Morgan, Labouvie, & Bux, 2003). Due to the fact that readiness to change has not demonstrated consistent predictive validity of drinking outcomes (Blanchard, Morgenstern, Morgan, Labouvie, & Bux, 2003; Capone & Wood, 2009; Carbonari & DiClemente, 2000; DiClemente, Schlundt, & Gemmell, 2004; Kaysen, Lee, LaBrie, & Tollison, 2009; Litt, Kadden, Cooney, & Kabela, 2003; Matwin & Chang, 2011; Project MATCH Research Group, 1997, 1998; Williams, Horton, Samet, & Saitz, 2007), other measures of motivation need to be used in the context of mechanisms of behavior change to validate the proposed causal chain of MI.

Measures of motivation that consistently demonstrate predictive validity of drinking outcomes (both daily and in aggregate) are daily measures (single item questions) of commitment to reduce and to abstain from drinking implemented through ecological momentary assessment (EMA), even when used in aggregate forms within analyses (Kuerbis, Armeli, Muench, & Morgenstern, 2013, 2014; Morgenstern et al., 2016). EMA is “repeated collection of real-time data on subjects’ behavior and experience in their natural environment” (Shiffman, Stone, & Hufford, 2008), and it has been used increasingly to examine the dynamic change processes within and outside of addiction treatment (Morgenstern, Kuerbis, & Muench, 2014; Wray, Merrill, & Monti, 2014). Given that multiple theories of behavior change in the context of addiction, such as self-regulation theory (Brown, 1998), self-determination theory (Deci & Ryan, 1985), and the Transtheoretical Model (Prochaska & DiClemente, 1984; Prochaska, DiClemente, & Norcross, 1992), view motivation as dynamic and context specific, EMA can offer unique advantages over cross-sectional measures of motivation. Context, such as location, day of week, and time of day, can facilitate or inhibit one’s motivation to change behavior. Thus, an EMA measure of motivation may have increased validity, eliminating retrospective biases, and providing a more useful tool at understanding how motivation changes over time. Furthermore, using separate items for commitment to moderate drinking and commitment to abstinence enhances understanding about daily, goal-specific commitment for a particular day (e.g., goal of abstinence on Monday, goal of reduced drinking on Thursday)—reflecting distinct patterns of how individuals choose to moderate drinking.

1.2. The current study

Given how little is known about how within psychotherapy session statements of commitment relate to reported commitment in a real world context, this study aimed to test whether in-session change talk predicted daily reports of commitment to reduce or abstain from drinking in a pilot randomized controlled trial examining the mechanisms of action of MI (Morgenstern et al., 2012). It was hypothesized that in-session client statements of commitment (strength,

frequency, and slope of strength across a session) from the first two sessions of therapy would predict daily EMA reports of commitment to reduce or abstain from drinking in the weeks that followed each respective session. As a secondary hypothesis, we predicted that both in-session change talk and daily reports of commitment would predict reduced daily drinking in the concurrent weeks of daily commitment reports. Given the proximity of daily commitment to daily drinking, we hypothesized that daily commitment would emerge as the stronger predictor of drinking.

2. Method

Problem drinkers ($n = 89$) with a goal of moderated drinking were recruited to participate in a pilot randomized controlled trial (Morgenstern et al., 2012). The purpose of the original study was to test MI’s hypothesized mechanisms of action, specifically its relational and technical elements, as outlined by Miller and Rose (2009), by disaggregating MI into its component parts. Detailed procedures are reported elsewhere (Morgenstern et al., 2012). Below is a brief overview of the study procedures pertinent to the current analysis.

2.1. Participants

Advertising, both online and in local media, were used to recruit heavy drinkers seeking to reduce but not stop drinking. Potential participants who contacted the study were initially screened on the phone and then, if eligible, were scheduled for an in-person screen assessment.

2.1.1. Study eligibility

Participants were eligible for the study if they: (1) were between ages 18 and 65; (2) drank an average ≥ 15 or 24 standard drinks per week for women and men, respectively, over the prior eight weeks; and (3) endorsed a current AUD. Exclusion criteria were: (1) having a substance use disorder or being a regular (greater than weekly) drug user (for any substance other than alcohol, marijuana, nicotine); (2) having a history of or being at risk for serious psychiatric disorder, suicide or violence; (3) history or current serious symptoms of physical withdrawal from alcohol; (4) a legal requirement to attend substance abuse treatment; (5) social instability (e.g., homeless); (6) a goal of abstinence at baseline; or (7) an expressed desire to pursue additional substance abuse treatment concurrent to the study period.

2.2. Procedures

Participants completed informed consent and the in-person screen assessment, and those who were eligible were 1) trained on the daily diary assessment (described further below) and 2) returned one week later to be urn randomized to one of three conditions: MI (containing both the relational and technical elements), Spirit-only MI (SOMI, containing only the relational elements of MI), and a non-therapy condition (NTC, previously referred to as self-change). Participants in the therapy conditions received four psychotherapy sessions, at baseline, and weeks 2, 4, and 8. All participants were reassessed at weeks 4 and 8. For the current study, only participants from the two therapy conditions and the first three consecutive weeks of IVR data (the pre-baseline week, the week after session 1, and the week after session 2) were used.

2.2.1. Daily diary: daily interactive voice recording (IVR) survey

Beginning the day of the screen assessment, participants were asked to respond once daily to a survey implemented via interactive voice recording (IVR; TELESAGE, 2005). Participants were instructed to call into the IVR, via a toll-free number, from 4:00 pm – 10:00 pm each day for a total of eight weeks, including the week prior to randomization. An automated call was made to remind participants to complete the survey if they had not called by 8:00 pm. The survey required between

two and five minutes to complete. For the present analysis, given that the greatest clinical gains occurred in the first two weeks of treatment, only the first 21 days of the IVR data were utilized, encompassing the pre-baseline week and the first two weeks of treatment. IVR compliance was 76.9% over the 21 day period.

2.2.2. Study interventions

At baseline, participants received normative feedback based on the Alcohol Use Disorder Identification Test (AUDIT, Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) that included a description of AUDIT risk categories. In both therapy conditions, MI inconsistent behaviors were proscribed, such as giving advice and confrontation, and warmth, egalitarianism, and unconditional positive regard for the client were emphasized. Therapists in both conditions took a non-judgmental, client-centered stance. Six therapists provided both interventions. There was high fidelity and significant discriminability of the interventions (Morgenstern et al., 2012).

2.2.2.1. Motivational interviewing (MI). MI contained both the relational and technical components of MI. Adapted from Project MATCH (Miller, Zweben, DiClemente, & Rychtarik, 1992; Project MATCH Research Group, 1993), the MI protocol included structured personalized feedback. In addition to the relational component, therapists were directed to focus on selective evocation and reinforcement of change talk.

2.2.2.2. Spirit only MI (SOMI). Within the SOMI condition, only the relational elements of MI were retained. All techniques or strategies to selective evoke and reinforce change talk (technical elements of MI) were proscribed. Instead reflective listening skills, such as open-ended questions and simple reflections, were focused on affect (Bohart, 1995).

2.3. Measures

2.3.1. Motivation to change

Motivation was measured four ways: in-session client utterances of commitment (both frequency and strength) and daily diary measures (via IVR) of commitment (to reduce or abstain from drinking), each described further below.

2.3.1.1. In-session commitment strength, frequency, and slope of strength. Using Amrhein's DARN-C coding (Amrhein, Miller, Yahne, Palmer, & Fulcher, 2003), therapy sessions were coded for change (focused on either drink reduction or abstinence, undifferentiated), sustain, and neutral talk utterances by clients, which were integrated into one scale. Entire sessions were coded in decile increments. To standardize sessions of varying duration (40–60 min), client utterances were coded in decile or 10% session-time increments. Two raters coded an overlap of 22 sessions. Pertinent to the present analyses, in which only commitment codes were used, ICC (absolute agreement, single measure, two-way random model) was 0.62 at the decile level—a value that falls in the “good” range (Cicchetti, 1994) for inter-rater reliability.

Aggregate, repeated measures (2 time points) variables were created for the strength and frequency of commitment statements for the average of the 9th and 10th deciles (for further details, see Morgenstern et al., 2012). For commitment strength, positive scores indicated greater intensity of commitment, and negative scores indicated a greater intensity of sustain talk. Frequency was a count of commitment to change utterances, regardless of their strength.

Some evidence suggests that the linear change in commitment strength during a session may be predictive of outcome (Miller & Rollnick, 2013). Thus, another repeated measure variable, slope of commitment strength, was used as an additional predictor, indicating the change in commitment strength across all deciles during sessions 1 and 2. Positive slopes indicated that commitment strength increased over the course of a session, whereas negative slopes indicated that

strength decreased over the session.

2.3.1.2. Daily commitment. Two items implemented via the IVR questionnaire measured commitment. The first item was “How committed are you not to drink heavily (that is, not to drink more than 5 drinks) over the next 24 hours?” (*daily commitment to moderate*). The second item was “How committed are you not to drink at all over the next 24 hours?” (*daily commitment to abstain*). The response set for both items ranged from 0 “not at all” to 4 “completely.” Pre-treatment aggregate variables were used as covariates in the respective models testing commitment as dependent variables.

2.3.2. Drinking outcomes

The primary drinking outcome variable was measured by aggregating a total of 6 items in the IVR which asked about number of certain types of drinks consumed since the IVR call the day before. Each item yielded a count of a distinct type of standard drinks (e.g., wine, beer). By summing these items, the total number of standard drinks were calculated for each day, yielding drinks per day (DPD). DPD was lagged for use in the model so that commitment was prospectively aligned with drinking in the next 24 h. A pre-baseline aggregate variable was used as a covariate. This variable was calculated by taking the average DPD across the pre-treatment week of IVR.

2.4. Analytic plan

Data used for this analysis was from the first two weeks of treatment. There were three reasons for this choice: 1) previous analyses (Morgenstern et al., 2012) demonstrated that the greatest clinical gains occurred during the first two weeks of treatment; 2) IVR data was particularly complete during this initial period of the study; and 3) a majority of the sessions coded using DARN-C occurred during the first two weeks of treatment (sessions 1 and 2, occurring at baseline and the end of week 1). To test hypotheses, only data from participants in the therapy conditions whose sessions were coded using DARN-C coding were utilized for this analysis. SOMI participants were included in this analysis, as previous analyses demonstrated that change talk occurred in that condition as well, though less than in the MI condition (Morgenstern et al., 2012). This yielded a sample of 48 participants, with two therapy sessions each. Selected participants were not significantly different on demographics from the whole sample. About 46% were male, and participants had an overall age of 40 years old ($SD = 11.3$).

Multilevel (MLM) models were utilized to account for the nesting of daily and weekly observations within participants. MLM offers the advantages of: accounting for non-independence due to nesting; being robust to missing data; and allowing for inclusion of random terms to model individual variability (Gibbons, Hedeker, & DuToit, 2010; Raudenbush & Bryk, 2002; Singer & Willett, 2003). First, MLMs were fit to the daily data, allowing for both random and fixed effects, to examine whether in-session commitment statements (*commitment frequency, commitment strength, and slope of commitment strength*) predicted daily IVR values of commitment in the subsequent seven days. Next, in-session *commitment frequency, commitment strength, slope of commitment strength* and *daily commitment to moderate* and *daily commitment to abstain*, were tested as independent predictors (i.e., in separate models) of drinking as measured by the IVR, in the weeks subsequent to therapy sessions and simultaneous to daily reports of commitment.

For all the outcome variables, *daily commitment to moderate, daily commitment to abstain*, and drinks per day, a normal distribution with an identity link function provided the best model fit. For these models, an unstructured variance-covariance matrix was specified. Models included random intercept terms and random slopes to allow for individual variability in commitment levels. For *daily commitment to abstain*, random slope was not significant, indicating the strength of associations between focal variables and commitment to abstinence

Table 1
Weekly averages of in-session and daily commitment and drinking across condition.

	MI N = (25)	SOMI N = 23)	Total (N = 48)
In session commitment			
Session 1 Strength***	2.4 (2.6)	0.2 (1.9)	1.3 (2.5)
Session 2 Strength***	3.8 (2.6)	1.5 (1.9)	2.7 (2.5)
Session 1 Frequency	4.1 (2.4)	3.3 (2.6)	3.7 (2.5)
Session 2 Frequency	4.9 (2.8)	3.6 (3.6)	4.3 (3.2)
Session 1 Slope of Commitment Strength***	0.25 (0.19)	0.08 (0.13)	0.17 (0.18)
Session 2 Slope of Commitment Strength***	0.13 (0.16)	-0.07 (0.25)	0.03 (0.23)
Aggregate daily commitment			
Pre-baseline Commitment to moderate	2.3 (0.9)	2.3 (0.9)	2.3 (0.9)
Week 1 Commitment to moderate	2.3 (0.8)	2.4 (0.9)	2.3 (0.8)
Week 2 Commitment to moderate	2.4 (1.0)	2.4 (0.9)	2.4 (0.9)
Pre-baseline Commitment to abstain	1.0 (0.8)	0.9 (0.9)	0.9 (0.9)
Week 1 Commitment to abstain	0.9 (0.8)	1.0 (1.1)	0.9 (0.9)
Week 2 Commitment to abstain	1.0 (0.8)	1.0 (1.0)	1.0 (0.9)
Drinking			
Pre-baseline DPD	5.3 (3.2)	5.4 (3.0)	5.4 (3.1)
Week 1 DPD	5.5 (3.4)	5.1 (3.0)	5.3 (3.2)
Week 2 DPD	4.9 (2.8)	5.1 (3.7)	5.0 (3.3)

*** $p < .001$.

were consistent across individuals. Time, condition, a variable denoting whether a day was a weekday or weekend day, and the seven day average of pre-treatment daily commitment or the seven day average of pre-treatment drinks per day (for each respective outcome variable) were entered as covariates (Bolger & Laurenceau, 2013). Analyses were implemented using the MIXED procedure in SAS 9.4 (SAS Institute Inc., 2002–2012).

3. Results

Basic descriptives of the variables of interest are shown in Table 1. Due to the repeated measures nature of the data, means and standard deviations are shown by week to test for condition differences. As expected and previously reported, there were significant differences between conditions on commitment strength. There were no condition differences based on commitment frequency, average daily commitment to moderate or abstain, or DPD.

Table 2 demonstrates mainly weak but significant correlations between commitment strength and frequency and IVR reports of commitment to abstain or reduce drinking.

3.1. In-session commitment predicting daily commitment

Table 3 shows the parameter estimates of each of the predictors in the six separate MLMs fit to the daily commitment data. In-session commitment frequency was the only significant predictor of daily

Table 2
Correlation coefficients between focal predictors and drinking.

Variables	2	3	4	5	6
1. Commitment frequency	0.04	0.12**	0.01	-0.34**	0.00
2. Commitment strength	-	0.33**	0.11	0.08	0.02
3. Slope of commitment strength	-	-	0.19**	-0.07	-0.10*
4. Daily commitment to resist drinking heavily	-	-	-	0.40**	-0.28**
5. Daily commitment to abstain	-	-	-	-	-0.10**
6. Daily drinks	-	-	-	-	-

* $p < .05$.

** $p < .01$.

Table 3
In-session commitment statements predicting daily commitment.

	B	SE	p Value
Outcome variable: daily commitment to abstinence			
Commitment frequency	-0.06	0.02	< 0.01
Commitment strength	-0.04	0.03	0.11
Slope of commitment strength	-0.22	0.30	0.48
Outcome variable: daily commitment to moderation			
Commitment frequency	-0.01	0.02	0.77
Commitment strength	-0.03	0.02	0.23
Slope of commitment strength	0.42	0.30	0.16

Covariates for these models were time, condition, weekday/weekend, and baseline daily commitment. Each predictor was tested independently (i.e., in a separate model).

commitment to abstinence, such that greater frequency of commitment utterances during session predicted reduced daily commitment to abstinence by 0.06 units. There were no significant predictors of daily commitment to moderate drinking.

3.2. In-session commitment and daily reports of commitment predicting drinking

Table 4 shows the parameter estimates from each of the five separate models for the five predictors of DPD. Only daily commitment to moderate drinking emerged as a significant predictor of DPD, such that a one unit increase in daily commitment to moderate drinking predicted a 0.47 decrease in drinks per day, i.e., for every unit increase in daily commitment to moderate, drinks per day decreased by just under half of a standard drink.

When in-session commitment variables were entered into a model together with daily commitment variables, controlling for baseline values where possible, both daily reports of commitment emerged as significant predictors (daily commitment to abstain, $B = -0.65$, $SE = 0.29$, $p < .05$; daily commitment to moderate, $B = -1.288$, $SE = 0.31$, $p < .001$). Based on these findings, drinks per day decreased by two-thirds of a standard drink for every unit increase in daily commitment to abstain and decreased by 1.3 standard drinks for every unit increase in daily commitment to moderate. No in-session commitment variable was significantly associated with drinking.

3.3. Post hoc analyses: moderating impact of daily commitment on relationship between in-session commitment and drinking

Given that previous studies discovered that baseline levels of daily commitment are predictive of outcomes on their own (Kuerbis, Armeli, Muench, & Morgenstern, 2013, 2014), we explored whether baseline daily commitment to moderate or daily commitment to abstinence during the pre-treatment week moderated the impact of in-session change talk—specifically the slope of commitment strength—on daily drinking. We hypothesized that having lower daily commitment to start combined with a positive slope of in-session change talk would yield

Table 4
Commitment predicting drinks per day.

	B	SE	p Value
In-session strength	0.04	0.02	0.11
In-session frequency	-0.01	0.03	0.65
In-session slope of strength	0.60	1.6	0.71
Daily commit moderation	-0.47	0.19	0.01
Daily commit abstinence	-0.23	0.18	0.16

Covariates in each model were time, baseline commitment (for models with daily commitment as predictors only), and baseline drinking. Each predictor listed above was tested in a separate model.

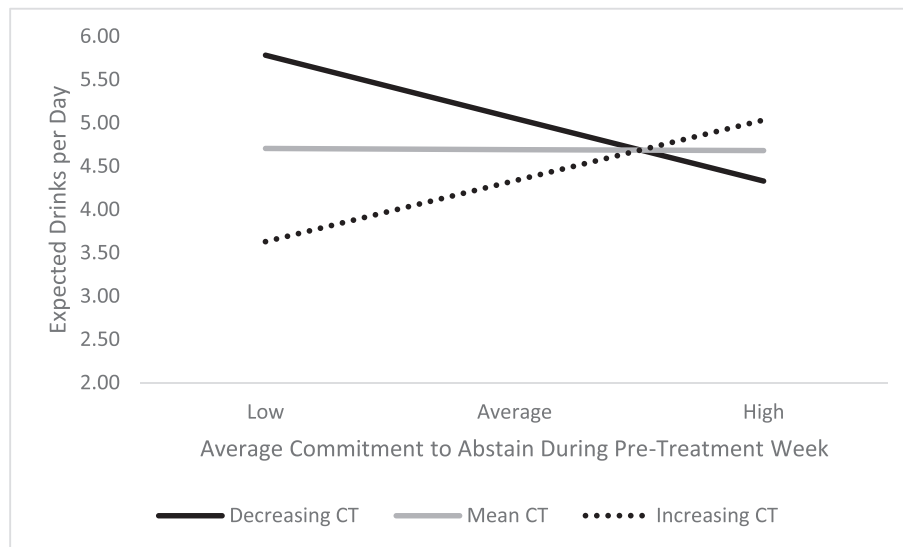


Fig. 1. Model based expected drinks for average commitment to abstain in pre-treatment week by slope of commitment strength during entire session.

reduced daily drinking in the subsequent seven days. Two separate models tested the moderating impact of each type of daily commitment on daily drinking. Interaction terms using the respective daily commitment variable (*commitment to moderate* × slope of in-session change talk, *commitment to abstinence* × slope of in-session change talk) were entered into their respective separate models predicting daily drinking. The interaction term with *commitment to moderate* was not significant ($B = 1.5$, $SE = 2.3$, $p = .51$); however, *commitment to abstain* yielded a significant interaction term ($B = 4.88$, $SE = 2.2$, $p < .05$). In-session change talk appears to have the most impact on drinking when commitment to abstain is low, whereas it has little impact on drinking when *commitment to abstinence* at baseline is already high (Fig. 1).

4. Discussion

The hypothesized causal chain of MI posits that in-session statements regarding commitment to change one's behavior are reflective of an internal change in motivation which influences subsequent behavior change (i.e., reduced drinking). The present analyses testing main effects of in-session statements on real world reports of commitment to abstinence or reduced drinking did not support the proposed causal chain—at least for an immediate time frame of the subsequent weeks after two sessions of MI. Consistent with previous analyses (Kuerbis, Armeli, Muench, & Morgenstern, 2013, 2014; Morgenstern et al., 2016), only main effects of real world reports of motivation directly impact drinking in this study.

Despite mostly null findings, there are a number of potential conclusions to be made and implications for future research. Interestingly, in-session reports of commitment to change were negatively related to average daily reports of commitment to abstinence, which may indicate that the focus of the sessions and discussions were strictly on moderation and thus an overt avoidance of commitment to abstinence speech in session. The fact that in-session reports of commitment to change did not then predict real world reports of commitment to moderation is puzzling and may in fact point once again to the complexity of motivation and its multiple dimensions within the context of behavior change. Indeed, there were mainly weak but significant correlations between commitment strength and slope and IVR reports of commitment to abstain or reduce drinking, suggesting that two distinct constructs are being measured. Main effect findings suggest that real world assessment, perhaps more than in-session statements, is critical for understanding the specific aspect of motivation with strong predictive validity for drinking outcomes.

Post hoc analyses offer a potential explanation for the lack of main effect findings and may begin to elucidate a potential relationship between real world commitment and in-session speech. High commitment to abstain prior to entering treatment appears to nullify the impact of increasing in-session commitment. Those with low commitment to abstain who then demonstrate increasing commitment strength across a session show the best response to treatment. In previous analyses, a general willingness to commit to abstain on some days during the week has been shown to predict outcomes, such that commitment to abstain may make a heavy drinker more likely to successfully moderate their drinking overall (Kuerbis, Armeli, Muench, & Morgenstern, 2013, 2014). It is important to note that a larger replication study of this pilot also found no moderating impact of commitment to resist heavy drinking on condition's (MI vs. SOMI) impact on drinking (Morgenstern et al., 2017). This again suggests there is a unique importance of occasional daily commitment to abstinence on ability to moderate drinking and underscoring the importance of extremely precise assessment of the type of commitment in alcohol treatment research. Unfortunately, the item inquiring about commitment to abstain was not assessed in the larger study. Overall, these findings are consistent with the treatment matching hypothesis that individuals with low motivation to change would respond best to MI (operationalized here as increasing strength of change talk across a session)—yet only in the context of a willingness to abstain.

Another possible explanation for lack of main effect findings is that the hypothesized timing of therapeutic effects resulting from MI, and thus in-session change talk, assumed for this study are incorrect. Analyses tested a change process with a short term timeline—in the week that followed each session. It may be that changes occur over a longer period of time. In fact, a recent analysis demonstrated a delayed effect of up to one year for in-session change talk impacting drinking during the COMBINE study (Houck, Manuel, & Moyers, 2018), while sustain talk had more immediate effects. In our study, client talk—whether change or sustain—was measured as one construct using a valence of positive (change-talk) and negative (sustain-talk). Separating these constructs could help to isolate the timing of the therapeutic impact of in-session talk, as is done with other forms of measuring in-session change talk.

4.1. Limitations

There are additional limitations to this study such that findings should be interpreted with appropriate caution. Data utilized in this

study did not account for the whole treatment period nor a long term follow up period, prohibiting any inference about longer term outcomes. Instead, only the first three weeks of the study were the focus of these analyses. While this limits the inferences and conclusions that can be made about the causal chain of MI, these three weeks were when most of the behavior change occurred (Morgenstern et al., 2012), thus had the greatest likelihood of demonstrating the possible dynamics of in session speech, motivation, and drinking. Another limitation may be an overall lack of sufficient variance of commitment for moderation and abstinence, as participants entered the study with high levels of readiness to change and high levels of baseline commitment. While this may be a possibility, intraclass correlations revealed that 68.5% and 67.3% of the variance of commitment to moderate and commitment to abstain respectively was explained by within person variance, suggesting that there was ample daily variation in these constructs—providing further support for assessing individuals at a daily or within daily level on these constructs to further understand change processes. Finally, the sample size was relatively small—a larger study might have revealed a potential mediational effect.

4.2. Future research

As a secondary data analysis, this study took advantage of an available dataset to answer the proposed questions as best as possible. Findings from this study point to a need for an explicit examination of the distinct facets of motivation to clarify the unique contributions of each context specific type of motivation to behavior change. Within session client statements for change are signs in an MI session that the therapist is appropriately evoking and reinforcing change talk. What remains unclear is the meaning of in-session change talk for the client and how that impacts subsequent behavior outside the session. Do in session statements actually prompt an internal change in motivation that is sustained outside the therapist's office? Or is there solely a more direct impact of on drinking? A previous study examining the relationship between readiness to change and in session change talk found little to no relationship between the two constructs in the context of Project MATCH (Hallgren & Moyers, 2011). Surprisingly few studies have examined the relationship between change talk and other measures of motivation to support the unique and active components of MI.

Such research should also include a variety of samples, such as with involuntary or mandated clients, among whom motivation might be at its lowest. In addition, utilization of both different measures of in-session change talk and commitment across contexts, including across different types of drinking goals, are required. In doing so, we may be better able to isolate what is occurring both within and outside of a psychotherapeutic session, thus more thoroughly testing the hypothesized causal chain.

4.3. Conclusion

Despite its limitations, this study is an important first step in testing the hypothesized causal chain at a more granular level—whether in session change talk impacts real world reports of commitment in the days following a session. It appears that commitment is just as context specific as self-efficacy—relying on what the daily drinking goal may be to determine level of commitment. This has important implications for how individuals approach moderated drinking—the strategies they choose may be critical to successful behavior change. Findings also reveal that the causal chain may be supported but only under certain circumstances—providing preliminary support for a matching hypothesis for low commitment to abstinence and evoking change talk—as well as information about when *not* to evoke change talk. A final important clinical implication of this study is that motivation is a multifaceted construct that should be attended to prior to treatment initiation, within treatment, and outside of session during treatment.

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