Leveraging Motivational Interviewing to Coach Teachers in the Implementation of Preventive

Evidence-based Practices: A Sequential Analysis of the Motivational Interviewing Process

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Abstract

Though emerging research supports the effectiveness of school-based coaching models utilizing motivational interviewing (MI), an examination of the specific drivers behind these effects is notably lacking in the prevention field. This study leveraged sequential analysis to examine how teachers' verbalization of change talk (i.e., language in support of change) and sustain talk (i.e., language in support of maintaining the status quo) was influenced by coaches' use of MI-consistent (i.e., collaborative language supportive of change) and MI-inconsistent (e.g., confrontational, directive) language, respectively. We also examined whether teacher and coach factors were related to coach-teacher language dynamics. Data were collected from 87 teachers in 16 elementary and middle schools randomized in a trial to the Double Check preventive intervention (see Bradshaw et al., 2018). Audio-recorded coaching feedback sessions were coded using an adapted version of the Motivational Interviewing Sequential Code for Observing Process Exchanges (MI-SCOPE). Sequential analyses indicated that MI-consistent and change talk were significantly more likely than chance to occur consecutively. Teachers' sustain talk was also more likely to occur sequentially with coach use of MI-consistent language and teacher change talk; the latter suggests teacher ambivalence. Coaches rarely used MI-inconsistent language and its occurrence was only associated with more MI-inconsistent language. Regression analyses indicated that teacher age, efficacy, burnout, classroom organization, and some design features (i.e., cohort, coach, coach-teacher racial match) were associated with different coach-teacher language dynamics. This novel school-based study illustrates how coaching MI evoked teacher change talk related to use of evidence-based programs.

When introducing preventive evidence-based practices (EBPs) in schools, there are often adoption and implementation barriers. A promising approach for overcoming some of these challenges and helping to encourage individual and systems change is Motivational Interviewing (MI; Miller, 1983; Miller & Rollnick, 2012; Miller & Rose, 2009). MI has a long history of use and research and has reached myriad fields and shown evidence of effectiveness (see Frey et al, this issue for a review). Of particular interest here is the use of MI in consulting with teachers to overcome ambivalence about and promote readiness for implementing prevention approaches in schools (Blom-Hoffman & Rose, 2007); MI has also been shown to improve teacher classroom management practices (e.g., Bradshaw et al., 2018). These changes in teacher practices or behavior are in turn expected to translate into improved student classroom behaviors. As a result, MI has been increasingly seen as an effective coaching and consultation technique to address the often-encountered ambivalence to change, limited motivation, and lacking empowerment by teachers to make changes in their classrooms (see Reinke et al., 2011). More broadly, the use of MI within coaching and consultation can be considered an implementation strategy "to enhance the adoption, implementation, and sustainment of a new…practice" (Lyon et al., 2019, p. 66). Yet little is known about the drivers of the MI process when embedded within school-based coaching or consultation (Lee, Frey, Herman, & Reinke, 2014).

The present study examined how coaching effectiveness is facilitated, or hindered, by MI language. We examined data within a randomized controlled trial testing the efficacy of Double Check, a professional development and coaching intervention aimed at improving teacher implementation of culturally responsive classroom management in the classroom (see Bradshaw et al., 2018). MI was embedded in the coaching to support teachers' use of classroom-based preventive practices, as research suggests that implementation of EBPs is often quite low among

teachers (Stormont et al., 2011). There is a growing body of research documenting that coaching that includes MI appears to be particularly impactful to address many of the identified barriers to EBP implementation (Frey et al., 2013; Lee al., 2014) and is therefore relevant for the field of prevention science and implementation science. This study builds on prior sequential analysis studies examining language dynamics through MI in substance use treatment research (e.g., see Drage et al., 2019; Gaume et al. 2008), and extends into schools. Specifically, we focus on how coaches' MI-consistent language (i.e., collaborative language supportive of change) related to teachers' change talk (i.e., language in support of change), as well as how MI-inconsistent (e.g., confrontational and directive) language related to teachers sustain talk (i.e., language in support of maintaining the status quo). We also explored whether teacher demographics and perceptions of the school context and coach differences were related to coach-teacher language dynamics. Our overarching goal was to understand the role of MI mechanisms applied to school coaching.

Motivational Interviewing in Schools

MI was originally developed in a clinical setting to address addictive behaviors and has extensive research demonstrating its effects (e.g., Magill et al., 2018). It has been and can be applied whenever ambivalence toward change is of concern. MI assists the "client"[1] in exploring and resolving their ambivalence about change to help with the development of new behaviors (Miller & Rollnick, 2012). MI theory asserts that the role of an MI implementer is to facilitate conversations that evoke the advantages of change, thereby moving the participant from feeling unready toward ready for change while still supporting their autonomy (e.g., see Frey et al., this issue). MI is gaining traction in schools (Herman et al., 2020), as it allows for a teacher-centered

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[1] In the case of teacher coaching, "clients" are teachers. We hereafter refer to clients as either participants or teachers.

approach to overcome ambivalence about practice (i.e., proximal behavioral) changes, facilitated by coach language demonstrating empathy and encouragement and empowering teachers in a non-judgmental and collaborative way (Miller & Rollnick, 2012). The coach assesses where the teacher is in the change process through their "change talk" and "sustain talk" and actively works to elicit the former (Miller & Rose, 2009). Fundamental is the assumption that ambivalence toward change is normative and that the possibility for change lies within the teacher. Thus, a coach implementing MI does not confront or challenge, but rather aids to resolve expected ambivalence (Miller & Rollnick, 2012) and build teacher self-efficacy. This is achieved through specific communication skills referred to as "OARS" or open-ended questions, affirmations, reflections, and summaries (see Miller & Rollnick, 2012 for details; Reinke et al., 2011).

The coach uses these four skills, in part, to guide the conversation to evoke teacher change talk. These skills also build rapport and support teacher automony. All OARS skills help build and sustain rapport and teacher engagement. Questions are asked openly to show curiosity and neutrality. Affirmations are genuine acknowledgements of the teacher's strengths or positive actions and convey the coach's positive regard and caring for the teacher. Reflections depict empathic listening and an understanding of what the teacher said; they can help improve readiness for change. At times, a reflection may embed the coach's own interpretation that the teacher can refine or expand upon. Finally, coaches summarize parts of the conversation to check for understanding, transition to new topic, and ideally, repeat, elicit, and elaborate upon change talk (for additional details, see Miller & Rollnick, 2012; Reinke et al., 2011).

Although there is much theoretical and conceptual writing on MI in schools (e.g., Blom-Hoffman & Rose, 2007; Frey et al., 2013; Lee et al., 2014) as well as testing of coaching and other interventions leveraging MI to promote teacher use of evidence-based strategies (e.g.,

Bradshaw et al., 2018; also see Larson et al., this issue), there is little research unpacking the "black box" of coaching. Such research to date focuses on global factors such as coach-teacher alliance (e.g., Johnson et al., 2017) rather than explicitly examining the nuanced coach-teacher language dynamics within coaching feedback sessions. Thus, below, we review extant literature on MI language from the substance use treatment field, where MI was first developed and has been the most prolifically studied.

Extant Measurement of MI Implementer and Participant Language

A number of MI implementation measures have been developed and utilized in substance use treatment research. Although a full review of these measures is beyond the scope of this paper, many are detailed in Frey et al. (this issue). Perhaps the most well-known measure is the Motivational Intervewing Treatment Integrity (or MITI; Moyers et al., 2015), which includes tallies of 10 specific OARS skills and global ratings of clinician competency. Though commonly used, it does not assess the participant language. The Motivational Interviewing Sequential Code for Observing Process Exchanges (MI-SCOPE; Martin et al., N. D.; Moyers & Martin, 2006) incorporates both practitioner behavior tallies (e.g., specific OARS skills) and participant responses (e.g., sustain and change talk). This measure requires multiple passes through the data to code global rating items; identify utterances; and tally OARS. Notably, these measures have been developed and used largely in clinical settings; the manuals do not address school-specific examples and there are no published applications to school-based MI. Thus, there is a need for adaptation of these and other such MI measurement tools to promote their use in schools.

Coach Language as a Facilitator of Change and Sustain Talk

Practitioners' use of OARS has been conceptually and empirically linked with change talk. A skilled implementer of MI attends carefully to change talk and can highlight and evoke

more change talk using MI skills (e.g., OARS). Among studies explicity examining MI skills

discretely, there are inconsistent findings (e.g., Apodaca et al., 2016; Laws et al., 2018). Studies

that have collapsed measurement across OARS skills, focusing on "MI-consistent" langauge

more generally, have documented significant associations with change talk and indicate some

greater consistency in findings than those examining the OARS skills discretely (e.g., Magill et

al., 2014, 2018; Moyers & Martin, 2006; Moyers et al., 2009). Two experimental studies of

substance use treatment sessions suggested a causal link between MI-consistent language and

participant change talk evocation (Glynn & Moyers, 2010; Morgenstern et al., 2012). Sequential

analysis studies have similarly shown that MI-consistent language occurs before change talk

during substance use counseling (Drage et al., 2019; Gaume et al., 2008) and within a career

counseling session (Klonek et al., 2016), but not within an organizational management context

among engineering advisors (Klonek et al., 2014). One subtsance use study did not report a link

between change talk and MI-consistent language (Gaume et al., 2016) but these associations did

emerge in the two review studies (i.e., Magill et al., 2014, 2019). It is possible that MI

implementer inexperience in the Gaume et al. (2016) accounts for the non-significant findings.

Perhaps as important as MI-consistent language is a practitioner's engagement in MI-

inconsistent language, such as confrontational, argumentative, or directive statements. Some

studies indicate either a feedback loop with sustain talk, where MI-inconsistent leads to sustain

talk and vice versa (Klonek et al., 2014) or an association with a decrease in change talk (Klonek

et al., 2016). Two systematic reviews also suggested that MI-inconsistent language is related to

more sustain talk (Magill et al., 2014, 2019) and to resistance behaviors (Drage et al., 2019;

Moyers & Martin, 2006). In conclusion, substance abuse counseling literature points toward

consistent relations between MI and change talk and MI-inconsistent speech and sustain talk; we are interested in whether this also applies in school-based coaching.

Change Talk as an Important Outcome of Interest

Empirical studies, again largely in substance use treatment literature, have established the convergent and predictive validity of participant change talk. There is evidence that change talk is associated with direct and mediated substance use outcomes. A review of 19 studies reported that (1) the most-consistently detected relations were between change talk and better outcomes; (2) participants experiencing/attuning to discrepancy between their current behavior and goals or values had better outcomes; and (3) MI-inconsistent language was linked to worse outcomes (Apodaca & Longabaugh, 2009). A recent series of meta-analyses largely confirmed the hypothesized role of change and sustain talk in predicting outcomes but suggests that this may be specific to more immediate, rather than longer-term outcomes (Magill et al., 2010, 2014, 2018). A notable and unique study of participant talk transitions (i.e., the analysis of two sequential language occurrences) demonstrated that clients' engaging in multiple sequential change talk statements had decreases in drinking (Houck & Moyers, 2015). This suggested that change talk momentum may be an important consideration. Taken together, these studies indicate that change and sustain talk outcomes and transitions are valuable to examine.

Known Moderators of MI and Change and Sustain Talk

There is relatively less research regarding moderators of whether MI is followed by change talk and several studies have largely focused on implementer factors. One study found that the relationship between MI-consistent language and client drinking outcomes was strongest for those with the most severe alcohol problems (Gaume et al., 2016). To our knowledge, no such studies exist for teachers or school-based coaching. It is possible, however, that teachers

with the greatest needs may similarly see the greatest benefits from MI-consistent language by their coach. Other school-based implementation research indicated that a teacher's perceptions of the coach or the working alliance with the coach also impacts implementation and acceptability of an intervention (Johnson et al., 2016; Reinke et al., 2013). Such factors, including initial teacher readiness for coaching, may similarly relate to the coach-teacher language dynamics.

Current Study

The main objective of this study was to further unpack the "black box" of MI-based coaching (i.e., beyond coach-teacher alliance, as in Johnson et al., 2017) and examine nuanced coach-teacher language dynamics within feedback sessions. To our knowledge, this is the first study of its kind in school-based coaching literature and addresses a measurement and empirical gap. We used a measure that assessed language of both parties to assess coach-teacher language dynamics. Our first aim was to examine the associations between MI-consistent and inconsistent language and teacher change and sustain talk. Based on extant research (e.g., Drage et al., 2019; Gaume et al., 2008; 2016; Glynn & Moyers, 2010; Klonek et al., 2014, 2016; Magill et al., 2014; Moyers & Martin, 2006), we hypothesized that MI-consistent language would facilitate change talk. Although we expected low rates of MI-inconsistent language, given the coach training and ongoing supervision, we hypothesized that MI-inconsistent language would facilitate sustain talk (Drage et al., 2019; Klonek et al., 2014, 2016). As a second aim, we examined whether baseline teacher factors related to coach and teacher language use (i.e., percent of utterances made by teacher, rates of coach MI and teacher change and sustain talk, and transitions between MI and change). We hypothesized that coaches would demonstrate more instances of MI with teachers with the greatest needs (e.g., high burnout, low efficacy, and poorer coaching readiness and classroom organization) and that teachers, in turn, would demonstrate more instances of change

talk (Gaume et al., 2016). These hypotheses were based on prior funding suggesting that these constructs appear to play a role in predicting EBP implementation (e.g., Cook et al., 2015).

Method

Research Design and Procedures

Data for this study come from a group randomized trial (RCT) of the Double Check intervention (Bradshaw et al., 2018). In each year, across four years (i.e., for the 2015-16 through 2018-19 school years), a district point of contact was approached about their interest in having schools participate in the trial and provided district approval. Districts helped recruit schools (e.g., suggesting schools and providing contact information) and school principals were approached either individually or in groups, when feasible. Interested principals were asked to sign commitment letters, which outlined the study requirements in writing (e.g., randomization, intervention details, and data collection). Once a school was recruited, classroom teachers of core subject areas (i.e., English Language Arts, Math, Science, and Social Studies) were approached with study information and asked if they wanted to participate in the study. Sixth and seventh grade teachers were prioritized, to allow for follow-up data collection, however eighth grade teachers were included in some schools. Interested eligible teachers provided written consent. Recruited schools were randomized to intervention or control status each year. Consented teachers in intervention schools also provided written consent to audio record the coaching sessions (i.e., they could consent to be in the study, but not provide consent for audio recording). The researchers' Institutional Review Board approved this study.

Participants

Teachers in intervention schools (only) were included in this study because these were the teachers who completed coaching. Audio recordings of the feedback sessions were collected

from 87 teachers in 16 of the 19 intervention schools (73% of all teachers who completed coaching). Teachers were relatively evenly spread across the 4 consecutive study cohorts (i.e., 18.4%, 23%, 25.3%, and 33.3% in cohorts 1-4, respectively), reflective of cohort and school size differences. White teachers (49.4%) comprised the largest proportion followed by Black/African American teachers (41.4%); 5.7% reported being an "other" race, and 1.1% each reported being Asian/Pacific Islander or Hispanic/Latino. Sixth grade teachers comprised the largest proportion (35.6%), followed by 7th (31.0%), multiple grades (25.3%), and 8th grade (8.0%). The largest proportion of this sample taught English Language Arts (32.2%), followed by Science (27.6%), Math (25.3%) and Social Studies (21.8%). Few teachers (8%) reported being first year teachers and 23% taught for 1-3 years, 24.1% taught for 4-8 years, and 40.2% taught 9 or more years. Regarding age, 23.0% each reported being 20-30 and 41-50 years old, 34.5% reported being 31-40, and 8.0% reported being 51 or older. Most teachers (81.6%) were female.

There were eight coaches who provided support to the four cohorts of teachers; six coaches worked with just one cohort and two worked with two cohorts. The coaches had degrees in education (i.e., four with a B.A. or M.A.; one with a Ph.D.) or psychology (i.e., three with a School Psychology Ph.D.) and all had prior coaching experience. Seven coaches were female; two coaches were Black/African American and six were White. Coaches were supervised bi-weekly by the first author, who listened to session audio and provided structured feedback.

Coaching Component of Double Check

The Double Check intervention is focused on improving teacher implementation of culturally responsive classroom management. Though Double Check consisted of school-wide professional development sessions, support for school-wide positive behavior supports, and coaching (see Bradshaw et al., 2018), the focus here was strictly on coaching. The coaching

component of Double Check is an adapted version of the Classroom Check-Up (Reinke et al., 2011), in which MI was embedded as a means for overcoming ambivalence and promoting teachers' feelings of efficacy to change their practices (Miller & Rollnick, 2012). Coaches were trained to view ambivalence as normative, to avoid MI-inconsistent behaviors (e.g., arguing, confrontation), and to utilize MI-consistent skills (i.e., OARS) to facilitate change talk and promote the teachers' self-guided instructional changes. Coaches were also trained to recognize change talk (e.g., need, desire, frustration with status quo) and reflect this to teachers.

MI was built into the staged problem-solving, beginning with an interview focused on rapport building, engaging the teacher, and evoking the teachers' desired classroom changes (Miller & Rollnick, 2012; Reinke et al., 2011). The second stage was data collection, where the coach visited each classroom three times to tally teacher and student behaviors and the teacher provided a self-reported checklist about the classroom for synthesis by the coach to inform feedback in the next stage. The third step was coach-provided feedback, which summarized objective information about the teachers' classrooms to help focus the teachers on areas they wanted to work on and to evoke teacher reasons to select an area. These were a one-on-one meeting between the coach and teacher and typically took 30-45 minutes. Notably, this feedback stage is where the most variability in MI is introduced, given that it is entirely tailored to each teacher and thus cannot be scripted as other steps are. For example, the interview and subsequent goal setting and action planning were heavily scripted with MI-consistent language. This variability and prevalence of focusing and evoking, to lay the foundation for planning, are the reasons that feedback sessions were selected for coding within this study. The fourth stage was goal setting and action planning, which embedded scripted MI techniques (e.g., importance and confidence rulers) to evoke change talk and commitment language (Amrhein et al., 2003).

Finally, the teacher received ongoing performance feedback and regular check-ins about progress toward the stated goals. These latter steps are beyond the purview of the current study.

Measures

Teacher self-report

Teachers completed a baseline survey prior to the intervention. This included self-reported demographic data (i.e., gender as male or female; race as White, Black, Hispanic/Latino, Asian/Pacific Islander, Native American, or Other; and age as 21-30, 31-40, 41-50, 51-60, or 61+). Using teacher and coach race, we calculated a racial match variable where 1 indicated that the teacher and coach identified as the same race and 0 indicated that they did not. Teachers also rated their coaching readiness, efficacy, and burnout. For each scale, item scores were averaged, such that higher scale scores reflected more of each construct and thus were desirable for readiness and efficacy and undesirable for burnout. Teachers answered five questions regarding their interest in coaching and the benefits they see in coaching, as an assessment of *coaching readiness* (α = .83). Two measures of self-efficacy were also included. *Behavioral management self-efficacy* was measured using five items from Hoy and Woolfolk's (1993) measure (e.g., "I can manage almost any student behavior problem"; α = .84). *Cultural efficacy* was measured with 11 items from the Intercultural Development Inventory (IDI; Greenholtz, 2000; Hammer et al., 2003, 2011; [α = .63]), which assesses intercultural competence or the ability to change one's cultural perspective and behavior to address cultural differences and similarities. Teachers responded to four items assessing their emotional exhaustion on the Maslach and Jackson (1981) *burnout* measure, which included items such as "I feel emotionally drained from my work" and "I feel like I am at the end of my rope" (α = .87).

Classroom observations

External observers conducted a systematic observation of each participating classroom teacher using the Classroom Assessment Scoring System – Secondary version (CLASS; Pianta et al., 2008). The CLASS is comprised of the three composite scores of emotional support, classroom organization, and instructional support. We selected to only include the classroom organization composite, which is the average of scores on three dimensions: behavior management, productivity, and negative climate. This composite was the most aligned to the coaching model, with its focus on behavior management and classroom climate. The CLASS-S is a commonly utilized and well-validated measure that requires observers to enter the classroom for 30 minutes (i.e., 15-minute timed observation for observer notetaking and 10-15 minutes for scoring the individual 11 dimensions). These observations were conducted on three occasions for each teacher and averaged for a single baseline assessment of classroom practices. Observers were hired by the research team, trained by CLASS trainers at Teachstone, and all had to meet reliability standards (i.e., 80%) within three testing windows, following the certification procedures outlined by the developers of the CLASS (Pianta et al., 2008).

Coding of coach and teacher language

All coach and teacher language were assessed during audiotaped coaching feedback sessions, using an adapted and integrated version of a commonly used MI coding system, the MI-SCOPE (Martin et al., N. D.; Moyers & Martin, 2006). Although the MI-SCOPE has been found to be reliable and valid, it is not particularly scalable regarding observers reaching reliability. Further, prior research demonstrates that it can result in a small number of instances for specific behaviors, creating analytic challenges (Martin et al., N. D.). Thus, instead of tallying specific OARS skills discretely, as the MI-SCOPE does, we collapsed the 30 MI implementer codes of the MI-SCOPE into MI-consistent, MI-inconsistent, and other language.

For teachers, we coded change talk, sustain talk, and other language, collapsing across the 16 MI-SCOPE behaviors. This adaptation followed from a coding system developed by Borden (2012) but was adapted to include a code for all language (i.e., the original measure did not code anything deemed as facilitating language), adding a fourth coach code for feedback, and updating all codebook examples to reflect classroom coaching examples (i.e., rather than clinician-provided assessment feedback provided to families). See Table 1 for the seven codes.

As suggested for the MI-SCOPE (Martin et al., N. D.), all audio recordings for this study were transcribed to optimize coders' ability to parse the utterances and thus promote reliability. Coding was entered by linking the audio recordings to the data entry system, Procoder (Tapp & Walden, 1993), which timestamped all codes in real time but allowed for pausing and restarting. All decipherable language was coded as one of the seven codes. Data files were saved separately for each feedback session and there was a row for each timestamped utterance and code.

Content Coding. The coding manual was adapted from Borden (2012), and thus began with updating manual examples to be relevant to school-based coaching and revising language for clarity with assistance from project coaches. Utterances were defined as any decipherable language that reflected one cohesive thought and ended when either the thought was complete and a new thought began with the same speaker or by an utterance from the other speaker. Each utterance was only coded once. The first and second authors then listened to audio of coaching feedback sessions for practice purposes and to aid in further refinement of the coding manual, utilizing audio from sessions not included in this study. Coding 10-minute segments of non-study audio were then conducted, with ongoing manual refinement, until the two coders reached 80% interobserver agreement (i.e., the number of agreed-upon codes within 5 seconds of one another, divided by the total number of utterances coded by either rater).

The second author coded all 87 audios and the first author double-coded 18 (i.e., about 21%) of these audios. Given that this was the first use of this adapted MI-SCOPE in school settings and there is no "master coder" (i.e., other than the lead coder for this study), the two coders engaged in a consensus process akin to qualitative research (Morse, 2015). The authors met weekly to discuss 1-2 of the sessions and to come to consensus for the disagreed-upon codes to ensure that there was no rater drift and that reliability for the main coder remained at 80% or higher with consensus codes. These ongoing discussions allowed for the continued addition of examples into the manual, to fully illustrate the coding rules and ensure that the manual could be utilized reliably by other coders. Inter-rater reliability was examined as the percent of agreements between the lead coder and the consensus coding using the same calculation noted above. All double-coded audios were discussed for consensus on key disagreements (e.g., coding differences; cases where utterance disagreements occurred at higher rates) and fully consensus coded. The main coder had an average percent agreement of 86% to the consensus codes.

Data Analysis

Processing of Language Codes using Sequential Analysis

The Multi-Option Observation System for Experimental Studies software program (MOOSES; Tapp et al., 1995) was utilized to analyze the transitional relationships between coded coach and teacher language data (i.e., coded in Procoder) using sequential analysis (i.e., a method for examining the probability of a code given the occurrence of a preceding code). Given the structure of the data files, the analyses utilized the data as situated in time and provided transition probabilities for each (of seven possible) behaviors (i.e., four coach, three teacher) following each of the same seven behaviors (Bakeman & Gottman, 1997). Specifically, a 7 x 7 matrix (49 total event combinations) is yielded (see Table 2), with a probability of each code

coming in sequence with all other codes. Of specific interest to this study were the transition probabilities between coach and teacher codes and whether teacher change talk was more likely to occur when preceded by coach MI-consistent language and teacher sustain talk was more likely to occur when preceded by coach MI-inconsistent language.

Significance tests of the individual transition probabilities were carried out using Yule's Q (Bakeman & Gottman, 1997) as well as Allison and Liker (1982) *z* scores. Yule's Q scores control for differences in the frequencies of codes and indicate whether the sequential relationship between two codes was larger or smaller than expected by chance. Yule's Q ranges from -1 to +1 with a value of 0 indicating independence. A positive Yule's Q reflects instances when the target behavior (e.g., teacher change talk) occurs after the given behavior (e.g., MI-consistent coach language) more often than expected by chance. When a target behavior occurs after the given behavior less often than expected by chance, Yule's Q is negative.

We were also interested in other coach-teacher language dynamics such as the prevalence of transitions involving MI and change talk, percent of utterances made by the teacher, and the rates per minute for coach MI and teacher change and sustain talk. Within MOOSES, utterance transition-level data was generated such that every possible combination of two codes was counted for each teacher; these data were aggregated to the teacher level and totaled. Any teacher with 1 or more MI and change talk transitions was coded as a 1 = presence of MI and change transitions. The total of all MI to change and change to MI transitions was also divided by the total utterance transitions within the session. The percent of teacher utterances was the total of all single teacher utterances divided by the sum of all coach and teacher utterances within the session. Note, this does not directly equate to the amount of time (i.e., minutes) spent talking.

Regression analyses

Within SPSS, regression analyses were conducted (i.e., logistic for the binary indicator of MI and change transitions and linear for all others). Each model included the design variables of cohort (i.e., three dummy codes for four cohorts), coach number (continuous variable of 1-8), teacher gender (1 = female), teacher race (i.e., 1 = White and 0 = all others), teacher age (1 = 30 or younger and 0 = 31 or older), observed classroom organization, and teacher self-reports of coaching readiness, intercultural efficacy, behavioral management efficacy, and burnout.

Results

Descriptive Analyses

The dataset of 87 coaching sessions included approximately 20 hours and 40 minutes of audio, yielding 8459 utterances and total (coach and teacher) codes. The most common category of coach language across all sessions (i.e., 56.26% of all coach speech) was other, with a mean rate of 2.30 instances per minute. MI-inconsistent was the least common category of coach language (0.34% of coach speech) with a mean rate of 0.02 instances per minute. For teacher language, other ($M = 2.55$ instances/minute; 92.59% of teacher speech) and sustain talk ($M =$ 1.49 instances/minute; 1.49% of teacher speech) were the most and least common categories, respectively. The ratio of total coach to teacher utterances was 1.48:1 (i.e., note that utterance counts do not equate to talk time). The most common transitions were between teacher other and coach feedback (22% of transitions for teacher to coach and 19% for coach to teachers) and additional other language (i.e., 10% of transitions were coach to teacher other and 9% were teacher to coach other). MI was most often followed by (4%) and preceded by (3%) teacher other language. Change talk was most often followed and preceded by feedback (1% each). Our primary transitions of interest, between MI and change talk, represented just less than 1% of all

coach-teacher transitions. Thirty-three of the 49 transition possibilities occurred < 1% of the time and nine never occurred at all (See Table 2).

Sequential Analyses

As described above, transition probabilities were computed using MOOSES and are presented in Table 2. Initial events are in rows and subsequent events in columns. Other than the first and last utterances of each coded session, all utterances were considered both an initial and subsequent event. Overall, coach and teacher speech were more likely to be followed by the other speaker, reflecting volleys of speech between coach and teacher throughout the feedback sessions. Several transitions occurred more frequently than would be expected by chance. For instance, coach MI was more likely than chance to be followed by teacher change talk (Yule's Q = .58, $Z = 7.24$, $p < .001$) and teacher change talk was more likely than chance to be followed by coach MI (Yule's Q = .43, $Z = 4.35$, $p < .001$). There were, however, four exceptions to the general pattern of coach-teacher volleys in speech. Teacher change talk was more likely than chance to be followed by teacher sustain talk (Yule's Q = .86, $Z = 9.96$, $p < .001$) and sustain talk was more likely to be followed by change talk (Yule's Q = .57, $Z = 2.62$, $p < .001$). For coach speech, feedback was more likely than chance to be followed by additional feedback (Yule's Q = .10, $Z = 2.83$, $p < .001$) and MI-inconsistent language was more likely to be followed by additional MI-inconsistent statements (Yule's Q = .94, $Z = 5.32$, $p < .001$).

Regression Analyses

Teacher factors were related to all examined language codes, except the teacher rate per minute of sustain talk. Not surprisingly, there was a negative R^2 for the sustain talk model, indicating no significant explanatory value. However, this was the only outcome where coach-teacher racial match was a significant predictor. The teachers coached by someone of their same

reported race engaged in significantly less sustain talk (β = -0.58, p = .04). Regarding teacher factors, among younger teachers (standardized β = -0.35, p = .01) and for teachers with better classroom organization (β = -0.26, p < .05), there was a lower percentage of utterance transitions between MI-consistent and change talk language. Consistently, young teachers (Exp[B] = 0.06; p < .01) and those with better classroom organization (Exp[B] = 0.20; p < .05) were also less likely to have one or more transitions between MI and change talk. Coaches engaged in less MI with young teachers (β = -0.39, p < .01) and young teachers engaged in less change talk (β = -0.31, p = .02). Coaches also used less MI with teachers who reported high intercultural efficacy (β = -0.25, p = .04) and more MI with teachers who reported higher burnout (β = 0.37, p < .01). Teachers with higher ratings of burnout were 2.5 times more likely to have at least one transition between coach MI and teacher change talk than teachers with lower burnout (Exp[B] = 2.51; p = .01). White teachers had a greater percentage of utterances than non-White teachers (β = 0.42, p < .05). Gender and teacher ratings of behavioral self-efficacy and coaching readiness were not significantly associated with any of the examined outcomes.

Finally, we explored a few design effects and found that the first two cohorts (β = -0.37, p < .01 and β = -0.49, p < .01, respectively) had a significantly lower percentage of teacher utterances than the final (i.e., 4th) cohort. Coaches also engaged in different rates of MI per minute (*M* rpm = 0.41, *SD* = 0.25, range 0-1.09; the highest average rate was 0.72 MI statements per minute and the lowest average rate was 0.16). No other significant effects emerged.

Discussion

The current study leveraged data from an RCT to examine various features of the MI coaching process. Sequential analyses of audio-coded coaching feedback sessions indicated that, as hypothesized, there was significant co-occurrence between coaches' use of MI-consistent

language and teachers' change talk. Although we did not detect the hypothesized associations between coaches' use of MI-inconsistent language and teachers' sustain talk, this was likely due to the very low rate of MI-inconsistent language. This low rate indicates that coaches were true to the MI approach and succeeded at refraining from MI-inconsistent speech. The observed teacher engagement in sequential change and sustain talk likely indicated ambivalence, as is considered normative in the MI literature; this may be similarly true for these phenomena in substance use literature (Magill et al., 2014). On the other hand, prior research by Apodaca et al. (2016) indicated that affirmations were the only MI-consistent language associated with change talk whereas open-ended questions and reflections were followed by both sustain and change talk. This may explain why the associations between MI-consistent language with itself, and both sustain and change talk were detected here; additional school-based coaching research examining the specific OARS skills would be needed to confirm if this is the case.

The fact that coach codes were most likely to be followed by teacher codes indicated the conversational nature of these sessions, as would be expected when MI is well implemented. On the other hand, the utterance rates of the coaches exceeded the teacher rate; in a counseling context, it is expected that client talk time will exceed counselor talk time (Miller & Mount, 2001). Unfortunately, we do not have a measure of actual "talk time" (i.e., the number of minutes spent talking). This finding may indicate greater coach talk time relative to teachers, which may be skewed by the fact that these were feedback sessions (i.e., interviews and goal setting should have more teacher talk time). Research in a range of settings and session types, which measures actual talk time, and linking this ratio to outcomes is needed.

When exploring our second aim, the regression analyses indicated that the co-occurrence of MI-consistent language and teacher change talk differed based on teacher factors, including

age, observed classroom organization, efficacy, and burnout. Coaches engaged in the lowest rates of MI with the youngest teachers and the highest rates with those who reported greater burnout and less cultural self-efficacy. Further, transitions between MI and change talk were lowest for younger teachers and those with better classroom observations. These findings supported our hypothesis around need, such that the needier teachers had higher likelihood of transitions between and rates of coach MI-consistent language and teacher change talk. We did not have a hypothesis about teacher age, but the lower rates of coaches' use of MI, teachers' change talk, and transitions between MI and change talk among teachers 30 years of age and younger is worth further examination. One unexpected finding was that White teachers had a higher percentage of utterances than non-White teachers. This is another area for future research and is particularly notable in this intervention, which focused on culturally responsive classroom management and issues of race. Interestingly, coach-teacher racial match was not a significant factor percentage of utterances. It could also be that there are differences between White and non-White teachers in their communication patterns. On the other hand, teacher-coach racial match was the only significant predictor of sustain talk; teachers coached by a same-race coach had lower levels of sustain talk. Teacher-coach match is another area for further exploration. A notable non-significant finding was coaching readiness, which was not associated with any outcome; this may indicate consistency in the MI theory that readiness for change needs to, and can, be evoked with participants at any level of readiness (Miller & Rollnick, 2012).

Limitations

While there are multiple unique features of this project, there were some limitations to note. Although focus on audio-recordings of school coaching coded for multiple features and sequential aspects of the MI process was unique, video recordings may have enabled additional

analytic nuance. This study and others have examined utterance frequencies; it is important to note that higher frequencies do not always reflect increased talk time and this may be another area to examine. To promote greater coding reliability and transportability of our coding approach, we opted to code broad categories of language, rather than specific subcategories of OARS skills. Similarly, we coded change and sustain talk utterance frequencies, but not the strength or type (e.g., need, desire, commitment) of such language. Another measure refinement to consider would be a more fine-grained tool, that assesses discrete talk types. Prior research in substance use treatment has indicated that there may be important nuances about commitment level that similarly would be relevant within the school setting (e.g., Gaume et al., 2016) but also demonstrate less consistent and conclusive findings. Thus, many MI fidelity measures, and studies have examined utterance frequencies in broad categories. This range of approaches reflects researchers' attempts to balance the development and use of optimally effective and sensitive measures with the need to also develop efficient and thus feasible measures (Schoenwald et al., 2011). It is possible that the loss of some efficiency in the current measure would allow for a more effective measure; it may also result in a less scalable and reliable measure. Ascertaining this would require additional measure development and research.

Also needed are studies examining how language codes relate to teacher implementation of new strategies and outcomes within the classroom. Prior research of substance use clinicians' skills indicate that baseline MI skills and degree level were related to responsivity to MI training (Carpenter et al., 2012) and that more experienced clinicians (Gaume et al., 2016) achieved better outcomes; we did not measure these or other factors, and were limited by the relatively small sample of eight coaches; moreover, these relatively small samples sizes of teachers and coaches also meant that we were not able to adjust for the nesting of teachers within coach.

Further, our sample lacked sufficient diversity to explore the racial match and other race-related factors with greater precision and sophistication. These and other issues are important to consider in future research with larger and more diverse teacher and coach samples. Finally, we did not examine the extent to which these aspects of MI translated into student behavior change, which according to our logic model, is the ultimate outcome of interest and the focus of future studies.

Conclusions and Implications

There is growing literature on the application of MI in coaching and consultation of teachers (e.g., Bradshaw et al., 2018). However, to our knowledge, this is the first study to examine how coach language is linked with teachers' use of change and sustain talk. This study highlights that extant MI measures used within clinical settings can be adapted for school-based prevention research. Our findings replicated research in counseling and many other contexts by indicating that MI-consistent language is a facilitator of change talk. Our findings also confirmed the MI theoretical premise that ambivalence is normative and common amongst teachers, representing a key consideration in schools when trying to promote EBP implementation. The data indicating that coaches varied in how much MI-consistent language they used and seemed to tailor their engagement in MI-consistent language based on teacher need (i.e., higher use with needier teachers) has implications for future coaching development and supervision. Given that coach use of evocative (i.e., MI-consistent) language predicted teacher change talk much as it does in clinical contexts, training coaches to use MI skills holds promise for building teacher motivation to implement better practices, and ultimately improve outcomes for students.

Compliance with Ethical Standards

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Table 1

Coding Scheme for the Coach and Teacher Language

Coach Codes	Teacher Codes
MI-Consistent *Affirm* (e.g., of efforts, progress, values) *Support* (offering understanding) *Emphasize control* (e.g., providing autonomy) *Open-ended question* (i.e., non-yes or no) *Permission seeking to provide advice* *Reflection* *Summarize*	**Change Talk** (indicates movement toward a new positive behavior) *Commitment* (e.g., I will) *Desire* (e.g., I wish/want) *Ability* (e.g., I can) *Need* (e.g., I need) *Reasons* (i.e., benefits of change) *Taking steps* (i.e., specific actions toward change)
MI-Inconsistent *Advise without permission* *Confront* (e.g., argue, correct, blame, persuade, criticize) *Direct* (e.g., tell teacher what to do) *Opine* (e.g., provide subjective information, usually for purpose to persuade) *Warn* (e.g., imply negative consequences or threats)	**Sustain Talk** (indications of maintaining the status quo) *Commitment* (e.g., I will or will not) *Desire* (e.g., I do not wish/want) *Ability* (e.g., I cannot) *Need* (e.g., I do not need) *Reasons* (i.e., benefits of status quo) *Taking steps* (i.e., specific actions toward maintenance or avoiding change) *Disagreeing with provided data* (i.e., denial of need for change)
Coach Other *Close-ended questions* (e.g., yes/no, multiple choice questions) *General information sharing* (e.g., to explain or educate) *Structure of the coaching process* (e.g., to outline what is next or to come) *Facilitative language* (e.g., yeah, right, ok) *Filler language* (e.g., small talk, pleasantries) *Self-disclosure* *Raise concern* (e.g., possible problems framed as concern)	**Teacher Other** *Follow* (e.g., responding to coach) *Neutral* (e.g., not indicating change or sustain) *Ask questions* (e.g., clarifying, seeking information) *Facilitative language* (e.g., yeah, right, ok) *Filler language* (e.g., small talk, pleasantries)
Feedback *Present objective data* *Reference what teacher shared in prior sessions*	

Note. Each utterance was only coded once; utterances were defined as any decipherable language that reflected one cohesive thought and ended when either one thought was complete and a new thought began with the same speaker or by an utterance from the other speaker. If one speaker was interrupted by the other speaker, but the interruption was during just one single thought and code, there were only two codes recorded at the end of the original speaker's utterance (i.e., one for each speaker). If segments represented different topics or thoughts, then each was coded separately.

Table 2

Transition Probabilities for Codes

Initial Event	Subsequent Event						
	Coach Codes				Teacher Codes		
	MI-Consistent	MI-Inconsistent	Coach Other	Feedback	Change Talk	Sustain Talk	Teacher Other
MI-Consistent	0.01‡	0.00	0.11‡	0.06‡	0.07***	0.02***	0.71***
MI-Inconsistent	0.00	0.05***	0.41	0.17	0.00	0.00	0.35
Coach Other	0.05	0.00	0.16‡	0.16‡	0.03***	0.00	0.57***
Feedback	0.02‡	0.00	0.21‡	0.21***	0.00‡	0.00‡	0.53***
Change Talk	0.12***	0.00	0.57***	0.09‡	0.00††	0.05***	0.13‡
Sustain Talk	0.29***	0.00	0.56***	0.01††	0.07***	0.00	0.03‡
Teacher Other	0.07***	0.00	0.58***	0.23***	0.01‡	0.00††	0.09‡

***More probable, $p < .001$; ††Less probable at $p < .01$; ‡Less probable at $p < .001$.

Table 3

Regressions of Study Design and Teacher Factors on MI Variables

Teacher Variables	MI Variables					
	MI-change transitions (0/1)	% Transitions involving MI and Change	% of Utterances by Teacher	MI rate per min	Change Talk rate per min	Sustain Talk rate per min
Constant/Intercept	1165.14	2.76	50.04	1.25	0.47	0.21
Cohort 1	0.50	0.13	**-0.37**	-0.18	0.02	-0.07
Cohort 2	0.28	0.16	**-0.49**	-0.08	0.04	-0.21
Cohort 3	1.78	-0.01	-0.10	0.16	-0.11	-0.19
Coach Number	0.87	-0.09	-0.23†	**-0.37**	-0.01	0.22
Female	5.48	0.12	0.17	-0.15	0.07	-0.10
White	12.58†	0.18	**0.42**	0.08	0.08	0.39
Young Age	**0.06**	**-0.35**	-0.16	**-0.39**	**-0.31**	-0.08
Coaching Readiness	0.88	-0.14	-0.04	0.07	0.06	0.03
Intercultural Development Inventory	0.23	-0.06	-0.05	**-0.25**	0.05	-0.14
Burnout	**2.51**	0.15	-0.10	**0.37**	0.12	0.09
Behavior Management Efficacy	1.63	0.00	-0.11	-0.11	-0.26	-0.09
CLASS: Classroom organization composite	**0.20**	**-0.26**	-0.03	-0.06	-0.16	-0.06
Coach-teacher racial match	0.10†	-0.08	-0.09	-0.10	-0.21	**-0.58**
R-squared for final model	0.27	0.02	0.32	0.26	0.05	-0.05

Note. Cohort was dummy coded, where cohort 4 was the reference point. Coach was coded continuously (1-8 for 8 coaches). First column provides Exp(B) to reflect odds for logistic regression and Cox and Snell R-square; all other columns reflect standardized B regression coefficients and adjusted R-square estimates. **Bold** indicates statistical significance at $p < .05$; † $p < .10$.