CHANGE TALK IN SMOKERS WITH SERIOUS MENTAL ILLNESS

by

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ABSTRACT OF THE THESIS

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Introduction: Change talk (CT), or client language that is consistent with making a behavioral change, has been found to contribute to Motivational Interviewing's (MI) efficacy. It is not known, however, if change talk helps to explain MI's effect on instigating a quit attempt in smokers with serious mental illness.

Methods: We measured CT and sustain talk (ST) in smokers with serious mental illness (SMI) randomized to receive a single session adaptation of motivational interviewing (AMI) or an interactive education intervention. We evaluated relationships between change/sustain talk, treatment condition, and quit attempts.

Results: Participants receiving the AMI condition had higher proportions of CT and lower proportions of ST than the interactive education condition. However, proportion of change talk did not mediate the relationship between treatment condition and outcome, nor was proportion of change talk in the tenth decile predictive of outcome above total proportion of change talk.

Conclusions: Our study is the first to show that motivational interviewing has the same change talk augmenting effect in individuals with SMI as those without SMI. Given that anhedonia, negative affect, and depressive symptoms are a major part of serious mental illnesses (American Psychiatric Association, 2013), it is encouraging that MI can generate change talk in this population. Future smoking cessation induction trials with

larger samples should investigate whether greater amounts of CT lead to increased quit

attempts in this population.

Keywords: motivational interviewing, serious mental illness, smoking, cessation, change

talk

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Introduction

Background

Motivational interviewing (MI) is a client-centered counseling style used to treat substance use disorders and improve health behaviors (Hettema, Steele, & Miller 2005). The goal of MI is to bring forth the client's intrinsic motivation to change, in part, by resolving ambivalence (Moyers 2014). Much of MI is rooted in Carl Rogers' client-centered therapy (Hettema et al. 2005), which holds that if a therapist expresses empathy, warmth, and genuineness towards the client, the client will find their own answer to their problem (Romano & Peters, 2016). A major difference between MI and Rogers' approach is that while the latter is non-directive, MI is not (Hettema et al. 2005). In MI, the therapist uses various techniques to guide the conversation towards change. Some of these techniques include reflections, open-ended questions, and summarizing (Apodaca & Longabaugh 2009; Romano & Peters 2016). These techniques delivered in an empathic, supportive, and collaborative environment should maximize the development of change talk (Lindqvist, Forsberg, Enebrink, Andersson & Rosendahl, 2017).

MI therapists seek to generate change talk, which is defined as language consistent with making a behavior change (Amrhein, Miller, Yahne, Palmer, & Fulcher, 2003), because it is considered the main active ingredient of MI (Amrhein et al., 2003). Change talk falls into two categories, preparatory or commitment language (Carpenter et al. 2016). Preparatory language indicates a desire, ability, need, or reason to change, and is related to increased commitment language. Commitment language indicates intention to change and is more strongly related to improved substance use and health outcomes than preparatory language (Carpenter et al. 2016; Amrhein et al. 2003). For example, a

client who says, "I may want to stop smoking", which is considered preparatory language, would be less likely to stop smoking than someone who says, "I plan on quitting smoking," which is considered commitment language.

The most accepted explanation for the effect of change talk on treatment outcomes comes from Bem's Self-Perception Theory (Bem 1972). According to this theory, people infer beliefs about themselves from their own behavior. This theory has been used to explain why change talk is an active ingredient of motivational interviewing (Moyers et al. 2007). According to this theory, when clients hear themselves saying that they want to, are able to, or have a reason to change their behavior it will strengthen their belief that they want to, are able to, or should change (Moyers et al. 2007). Conversely, when they hear themselves saying they do not want to change their behavior they strengthen their belief that they do not want to change.

In a seminal study, Amrhein et al. (2003) coded the MI sessions of 84 clients who had participated in a substance use outcome trial. In this study, MI was added to an empirically supported substance use treatment to assess whether it improved treatment outcomes. In their first set of analyses Amrhein et al. (2003) split up the participants into four groups based on their drug use at baseline and at follow-up. "Maintainers" came into treatment with a large proportion of days abstinent and maintained this abstinence at 3, 6, and 12-month follow up. "Changers" began treatment with few abstinent days but reported a large proportion of days abstinent at follow-up. "Strugglers" began treatment with a small proportion of days abstinent and made little change. "Discrepants" were individuals whose self-report differed from their urine drug screens.

Amrhein et al. (2003) examined the pattern of change talk in each group by dividing the MI session into ten deciles and comparing patterns of change talk between groups in each decile. The Changer, Struggler, and Discrepant groups used language in favor of drug use, while the Maintainer group was equivocal about drug use in the first decile. Then, at the fifth and the tenth decile, the Maintainer and Changer groups expressed a strong commitment to abstinence, while the Struggler and Discrepant groups expressed a desire to continue using. Amrhein et al. (2003) stated that the tenth decile was the most important because the strength of change talk during this decile most reliably separated the groups. This separation likely occurred because it is in the tenth decile that clients assessed the impact of their change plan and considered barriers to its implementation. Changer and Maintainer groups continued to express commitment to abstinence while individuals in the Struggler and Discrepant groups used language in favor of continued drug use at this point in the session.

In addition, Amrhein et al. (2003) assessed the predictive power of change talk, irrespective of substance use at baseline. They combined the "Changers" and "Maintainers" into one group, and the "Strugglers" and "Discrepants" into a second group. They then looked for differences in level of commitment strength between the two groups. As the session approached the 10th decile, commitment strength increased in both groups, however while the changer/maintainer group continued to exhibit increases in commitment strength during the 10th decile, individuals in the struggler/discrepant groups' commitment strength returned to baseline. In summary, this study was the first to demonstrate that level of expressed commitment strength predicts drug use outcomes (Amrhein et al. 2003; Gaume et al. 2016).

Numerous studies have supported these findings (Gaume et al. 2016; Vader, Walters, Prabhu, Houck, and Field 2010; Carpenter et al. 2016; Moyers et al. 2007; Romano & Peters 2016). Gaume et al. (2016) found that greater levels of change talk were associated with reduced drinking. In a study of MI with feedback for alcohol use, researchers found that individuals with more frequent in-session change talk reported better treatment outcomes at 3-month follow-up, while individuals with more frequent in-session sustain talk reported worse treatment outcomes at 3-month follow-up in the MI with feedback condition (Vader et al. 2010). Outside the treatment of alcohol use disorder, Carpenter et al. (2016) found that stronger levels of change talk led to reduced cocaine use, and in a secondary analysis of data from Project MATCH, a multi-site treatment study for alcohol use disorders, greater levels of in-session change talk predicted improved substance use outcomes (Moyers et al. 2007). Finally, in a meta-analysis of thirty-seven studies that looked at MI and the impact of change talk, Romano and Peters (2014) found that greater levels of change talk were associated with less alcohol consumption at study completion and follow-up.

In addition, greater levels of sustain talk have been found to lead to worse substance use outcomes (Magill et al. 2014). Sustain talk consists of statements made by the client in favor of continued drug use and negatively impacts treatment outcome (Magill et al. 2014). In a study among college students, more instances of sustain talk were correlated with greater alcohol consumption (Apodaca et al. 2014), and in a 2014 meta-analysis (Magill et al. 2014), it was found that more sustain talk led to worse results post-treatment.

Efficacy of MI. MI has been used to successfully treat alcohol use disorder, tobacco use disorder, and other substance use disorders. Motivational interviewing leads to reductions in weekly and monthly alcohol use (Walker et al. 2017; Murphy, Chen, Naar-King, & Parsons, 2012; Gaume et al. 2016), reductions in monthly binges (Lee et al. 2013), increased abstinence from alcohol (Dieperink et al. 2014), and reductions in regular marijuana use (Stewart, Siebert, Arlt, Moise-Campbell, & Lehinger, 2016). Furthermore, meta-analyses and comprehensive reviews have found MI to be efficacious for the treatment of alcohol and substance use disorders (Dunn, Deroo, & Rivara 2003; Hettema et al. 2005; Smedslund et al. 2011). In addition, MI can be effectively delivered via various formats, including one-on-one (Murphy et al. 2012), over the phone (Walker et al. 2017), or in groups (Nyamathi et al. 2011; LaBrie, Thompson, Huchting, Lac, & Buckley, 2007). The treatment works with a wide variety of age groups, can be culturally adapted, and can be modified by adding feedback or other treatment components (Stewart et al. 2016; Lee et al. 2013; Steinberg, Ziedonis, Krecji, &Brandon, 2004, Steinberg, Williams, Stahl, Dooley Budsock, & Cooperman, 2016).

In addition, numerous studies have shown MI to be an effective treatment for smoking cessation (Lai, Cahill, Qin, & Tang, 2010; Hettema & Hendricks, 2010; Battaglia et al. 2016; Huang, Jiao, Zhang, Lei, & Zhang 2015; Gantiva, Guerra, & Vila, 2015; Mujika et al. 2014; Louwagie, Okuyemi, Ayo-Yusuf, & Olakelan 2014; Manuel, Lum, Hengl, & Sorensen, 2013; Lindqvist et al. 2013). For example, adding an MI component to a telephone-based intervention led to reductions in daily cigarette use among veterans diagnosed with PTSD (Battaglia et al. 2016). In one study, a family-assisted MI intervention for smoking cessation led to more quit attempts and more days

without smoking than an education only intervention (Huang, Jiao, Zhang, Lei, & Zhang 2015). In another study, more nurses receiving MI successfully quit smoking 3-months later compared to those receiving treatment as usual (Mujika et al. 2014). When brief motivational interviewing was compared to an advice-only intervention, 21.5% of individuals in the MI group reported not smoking for six months compared to 9.3% in the control group (Louwagie, Okuyemi, Ayo-Yusuf, & Olakelan 2014). MI led to reductions in average daily cigarette use in HIV-infected female smokers (Manuel, Lum, Hengl, & Sorensen, 2013), predicted greater increases in motivation to quit than an advice only or no treatment condition (Gantiva, Guerra, & Vila, 2015), and CBT for smoking cessation plus MI led to decreased cigarette use six months later (Lindqvist et al. 2013). Finally, two meta-analyses have found that MI is an effective treatment for smoking cessation (Lai, Cahill, Qin, & Tang, 2010; Hettema & Hendricks, 2010).

Smoking and serious mental illness. Although there are a large number of studies measuring change talk in substance using populations without SMI, we are aware of no studies on the effect of change talk on treatment efficacy in populations with serious mental illness. This is problematic as a disproportionate number of individuals who use substances suffer from a psychiatric diagnosis (Nesvag et al. 2015; Hartz et al. 2014). This is particularly relevant in the field of tobacco use because smoking continues to be the main preventable cause of death in the United States, with approximately fifteen percent of US adults continuing to smoke cigarettes (Centers for Disease Control, 2016). Individuals who smoke cigarettes have a greater likelihood of experiencing a heart attack or stroke, developing lung disease, or various types of cancer (U.S. Department of Health and Human Services, 2014). In particular, this is an issue in individuals with bipolar

disorder and schizophrenia, where smoking rates exceed fifty percent (Garcia-Portilla et al., 2016). Smoking can greatly elevate the risk of death from heart disease in individuals with schizophrenia (Kelly et al., 2011) and has been found to be the main contributor to premature mortality in this population (Dickerson et al. 2016). For these reasons, it is imperative that we improve cessation rates among those with serious mental illness.

In the two studies examining this issue, adaptations of motivational interviewing (AMIs) were more effective than an education-only intervention in motivating smokers with severe mental illness to make quit attempts and/or to seek formal treatment for tobacco use disorder (Steinberg et al., 2004; Steinberg et al., 2016). Both studies used an adaptation of motivational interviewing (AMI) as the intervention (Steinberg et al. 2004; Steinberg et al., 2016). Adaptations of motivational interviewing retain the core principles of MI while integrating them with techniques from other treatments (Steinberg et al. 2016) and have been shown to be effective in helping individuals quit smoking (Bredie, Fouwels, Wollersheim, Schippers 2011; Borrelli, McQuaid, Novak, Hammond, & Becker 2010). Although more studies are needed, these two studies provide preliminary support for the efficacy of MI for smoking cessation in individuals with serious mental illness. However, whether or not MI is effective in this population for the same reasons remains unclear.

Rationale

There are no studies to our knowledge examining whether change talk in MI in individuals without serious mental illness works in the same way as in populations with serious mental illness. Language deficits are a key part of schizophrenia (Brown & Kuperberg, 2015), and individuals with serious mental illness, many of whom have a

schizophrenia spectrum disorder, may have different speech patterns. Therefore, it is important to determine whether the active ingredients of MI are the same across populations so future adaptations of motivational interviewing can better target relevant mechanisms of change.

Hypotheses. We predicted that there would be a higher proportion of change talk and a lower proportion of sustain talk in the AMI group. We predicted that individuals who made a quit attempt would produce a higher proportion of change talk and a lower proportion of sustain talk. In addition, we predicted that change talk would mediate the relationship between intervention and outcome. Finally, we predicted that the proportion of change talk in the tenth decile would most accurately predict whether a participant was going to make a quit attempt.

Methods

Participants

This was a secondary data analysis of a study assessing the efficacy of an adaptation of motivational interviewing for addressing tobacco use in individuals with schizophrenia, schizoaffective disorder, and bipolar disorder. The original study has been described in full elsewhere (Steinberg et al., 2016). Our total sample included 82 participants. Participants' age ranged from 22-63 years old (M=42.56, SD=10.148). The sample was 45.1% female, 58.5% white, 79.3% smoked regular cigarettes, 62.2% smoked menthol cigarettes, 62.2% were never married, and 90.2% were unemployed. The mean age participants began smoking regularly was 16.52 years old (range = 7-43, SD = 5.938). Smokers reported attempting to quit an average of 2.79 times (SD = 2.696). See Table 1 for a complete list of demographic characteristics

Measures

Structured Clinical Interview for DSM-IV Disorders (SCID) (First, Spitzer, Gibbon, & Williams, 2002): This is a semi-structured interview used to determine DSM-IV Axis I diagnoses. The scale has strong inter-rater reliability and was used to confirm schizoaffective, schizophrenia, and bipolar disorder diagnoses (Steinberg et al. 2016). Modules A-D were administered to confirm diagnoses.

Timeline Follow Back (TLFB (Sobell & Sobell 1996): The TFLB was used to assess daily cigarette use and the study authors defined cessation as self-reported 7-day point prevalence abstinence, biochemically confirmed with expired carbon monoxide less than 10ppm at 1-month follow-up.

Client Language Easy Rating (CLEAR) Coding System (Glynn & Moyers, 2012): The CLEAR is a coding system used to calculate the proportion, or frequency, of change talk and sustain talk in an MI session. The instruction manual includes information on how to train and assess coder reliability, how to code each session, how to classify speech as change talk or sustain talk, and guidelines for times the coder is unsure of how to code a statement.

Procedure

Coding was completed using the CLEAR coding system**.** Three trained coders listened to both a full MI session and full Interactive Education session. Each tape was coded using a table provided by the experimenter. The table had two columns, one for change talk and one for sustain talk, and ten rows for each decile. A total of 82 tapes were coded, with 24 percent of the tapes coded for reliability.

Each utterance of change talk was noted, summed and divided by total utterances of change talk and sustain talk to calculate the participants' total proportion of change talk: total CT/(total CT + total ST) (Glynn & Moyers, 2012). Similarly, each utterance of sustain talk was noted, summed, and then divided by the total utterances of change talk and sustain talk to calculate the participants' total proportion of sustain talk: overall ST/ (total CT + total ST) (Glynn & Moyers, 2012).

Rater Training

Three raters were trained and supervised by a graduate student who was first trained in the CLEAR coding system by a Ph.D. level clinical psychologist. Training involved studying the CLEAR manual, coding MI sessions, and quizzes on the coding system (Gaume et al. 2016). Coders were then asked to independently code non-study MI sessions until they reached an adequate level of inter-rater reliability. Once this was reached, raters began to code study tapes. Twenty four percent of tapes were double coded with an intraclass correlation coefficient of .73.

Analyses

We ran bivariate correlations, and a one-way ANOVA to rule out confounding relationships between demographic and dependent variables. We ran multiple independent samples t-tests to determine whether those randomized to receive the AMI intervention engaged in a higher proportion of change talk and a smaller proportion of sustain talk than those receiving the psychoeducational intervention. We also ran independent samples t-tests to determine whether those who made a quit attempt produced a higher proportion of change talk and a smaller proportion of sustain talk. Finally, we ran a mediation analysis using PROCESS, which is a macro that uses linear

regression and a path analytic framework to assess mediation (Hayes & Rockwood, 2017). PROCESS moves away from the analytic strategy popularized by Baron and Kenny (1986) which uses a causal steps approach to determine mediation.

The PROCESS macro specifies the indirect effect as a measure of whether a variable exerts a mediating effect (Hayes & Rockwood, 2017). The indirect effect is quantified as (a*b). If it is found to be significant, then we can reject the null hypothesis and assert that the variable under consideration is a mediator even if none of the other relationships in the analysis are significant.

We ran 2 mediation models with quit attempt (yes/no) as our outcome variable. We ran one model with treatment condition as the independent variable, quit attempt as the dependent variable, and change talk as the mediator. We ran a second mediation model with sustain talk as the mediator. Diagnosis was entered as a covariate in all models.

We then ran a stepwise logistic regression with total proportion of change talk entered in in the first step and proportion of change talk in the decile entered in the second step. Finally, we ran a logistic regression with proportion of change talk and sustain talk as our independent variables, and whether they followed up with a smoking cessation treatment provider as the dependent variable.

Results

Manipulation Check. To confirm that, consistent with theory, those receiving the AMI intervention engaged in more change talk and less sustain talk as compared to those receiving the psychoeducational intervention, we compared the groups with respect to the proportion of change and sustain talk produced. Consistent with previous research

(Magill et al., 2019), participants randomized to receive the AMI intervention made more total "utterances" as compared to those receiving the psychoeducational intervention (M =36.05, SD = 11.45 vs. M = 13.14, SD = 6.33, $t(62)$ = 11.21, p=0.00). To account for the higher number of utterances provided by those randomized to the AMI intervention, we examined the proportion, rather than the raw number, of change and sustain talk utterances both groups provided. Those receiving the AMI intervention engaged in a higher proportion of change talk (M = .78, SD = .16 vs. M = .61, SD = .23), $t(72)$ = 3.92, p=0.00, and a lower proportion of sustain talk (M= .39, SD = .23 vs. M= .22, SD=.16), $t(72)$ = -3.92, $p<0.00$, as compared to those receiving the psychoeducational intervention. In addition, we found a relationship between intervention group and proportion of change talk (β = -.1718, t = -3.8920, p = .0002) and sustain talk (β = .1718, t = 3.8920, p = .0002).

Mechanisms of Change. We examined the proportion of change talk and sustain talk produced among those who did and did not make a quit attempt. We found there was no significant difference in the proportion of change talk ($t(80)$ = -1.442, p = .153) or sustain talk ($t(80)$ = 1.442, p = .153) produced between the two groups. However, there was a significant difference in the employment status between those who did and did not make a quit attempt. Therefore, we ran an ANCOVA to determine whether there was a difference in proportion of change talk and sustain talk produced between quit attempters and non-quit attempters when controlling for employment status. There was no significant difference in either proportion of change talk or sustain talk while controlling for employment status, $F(1,79)$=. 307, p = .581. There were no significant differences in age, marital status, or race between those who made a quit attempt and those who did not.

We found significant effects in our models examining the mediating effect of change talk and sustain talk on quit attempts. In model 1 (proportion of change talk) controlling for diagnosis, we found a total effect (β = -1.3165, z = -2.2696, *p* = .02), but no direct effect (β = -1.1737, z = -1.8832, *p* = .0597) or indirect effect (β = -.1543, 95% CI [-.9053, .5357]. In model 2 (proportion of sustain talk) controlling for diagnosis, we found a total effect (β = -1.3165, z = -2.2696, *p* = .02), but no direct effect (β = -1.1737, z = -1.8832, *p*=.0597) or indirect effect (β = -.1543, 95% CI [-.8566, .5986].

In addition, we ran a stepwise logistic regression to see whether proportion of change talk in the 10th decile would predict quit attempts above total proportion of change talk. There was no significant effect for either total proportion of change talk, OR = 6.806, *Wald*(1) = 1.840, *p* = .175, 95% CI [.426, 108.683] or proportion of change talk in the 10th decile, OR = .388, *Wald*(1) = .324, *p* = .569, 95% CI [.015, 10.065].

In the original study (Steinberg et al., 2016), the authors found that about 30% of individuals in the AMI group and 20% of individuals in the interaction education group contacted a treatment provider to try and receive help quit smoking. Therefore, we ran a logistic regression to determine if proportion of change talk predicted this behavior. There was no significant effect for either proportion of change talk, OR = 2.570, *Wald*(1) = .493, *p* = .483, 95% CI [.184, 35.801] or proportion of sustain talk, OR = .389, *Wald*(1) = .493, *p* = .483, 95% CI [.028, 5.421].

Discussion

To our knowledge, this is the first study to look at the frequency of change talk and sustain talk and its effect on treatment outcome in individuals with SMI. We coded tapes of a single session adaptation of motivational interviewing (AMI), and a time

matched interactive education intervention, for frequency of change and sustain talk. We predicted that participants receiving the AMI intervention would produce a higher proportion of change talk and a smaller proportion of sustain talk. We also predicted that individuals who made a quit attempt would produce a greater proportion of change talk and a lower proportion of sustain talk. In addition, we expected proportion of change talk to mediate the relationship between intervention and outcome. Finally, we predicted that proportion of change talk in the tenth decile would be the strongest predictor of whether an individual made a quit attempt.

As hypothesized, the AMI group produced a greater proportion of change talk and a smaller proportion of sustain talk. These findings are in line with research investigating the relationship between motivational interviewing, motivational interviewing consistent behaviors (MICO), change talk, and sustain talk in non-SMI populations (Moyers et al., 2007; Gaume, Gmel, Faouzi, & Daeppen 2008; Vader et al., 2010). We also found that the AMI elicited almost three times more total utterances than the interactive education intervention, which is in line with previous research (Magill et al., 2019). This finding is significant because the education condition was developed to be more engaging, however the AMI was significantly better at generating client speech. Based on these findings, our study is the first to show that motivational interviewing exerts the same effects on client language in individuals with SMI, as it does in non-SMI populations. Further implications of these findings will be discussed below.

Our second hypothesis was not supported. There was no significant difference in the proportion of change talk between individuals who did and did not make a quit

attempt. The inability to find a significant difference may have been due to a lack of power to detect a significant effect (Faul, Erdfelder, Lang, & Buchner, 2007).

One finding that should be noted is the fact that individuals with a better employment status were more likely to make a quit attempt. This may be because employment status could serve as a proxy for level of functioning, and that higher functioning individuals are simply more likely to make a quit attempt because they have a greater capacity to reflect on what was discussed with the clinician and act on these beliefs. In addition, individuals who are employed may have more of an incentive to quit because smoking interrupts their work day and may expose them to more judgment from non-smoking coworkers.

Contrary to hypotheses, CT did not mediate the relationship between intervention and outcome. This contradicts previous research in populations without serious mental illness (SMI) (Eaton et al., 2018; Houck, Manuel, & Moyers, 2018; Pirlott, Kisbu-Sakarya, DeFrancesco, Ellitt, & McKinnon, 2012; Moyers, Martin, Houck, Christopher, & Tonigan, 2009). In three of these studies, they found that the amount of change talk explained the relationship between motivational interviewing consistent behaviors and reduced drinking (Eaton et al., 2018; Houck, Manuel, & Moyers, 2018; Moyers et al., 2009). In a fourth study looking at MI for health behaviors, the authors found that it mediated the relationship between MI counselor's skills and increased fruit and vegetable consumption (Pirlott et al., 2012).

Sample size and the number of individuals who made a behavior change was one major methodological difference between our research and previous studies. Eaton et al. (2018) and Houck et al. (2018) had samples of over 140 and 250 participants. To increase

the likelihood they would find a mediation effect, Pirlott et al. (2012) analyzed a smaller subsample made up of an equal number of individuals who changed and did not change their health behaviors. Therefore, sample size and sample composition may contribute to the difference between our results and previous research. However, we were unable to conduct a power analysis because a technique for calculating power for a mediation analysis, which includes both a categorical independent and dependent variable has yet to be described (Zhang 2014).

It is also possible that change talk is not MI's main mechanism of change in this population. MI's two theorized active ingredients, change talk and the therapist's open, nonjudgmental stance are thought to work together to promote behavior change (Miller & Rose, 2009). However, in populations without serious mental illness, more support has been found for change talk as the mechanism through which MI functions (Magill et al., 2018). It may be though that in individuals with serious mental illness therapist warmth and empathy are significant parts of the treatment's efficacy.

Although we did not find a mediating effect for proportion of change talk on quit attempts, there are a number of significant implications that can still be drawn from the study. Individuals with SMI suffer from interpersonal, affective, and speech deficits (American Psychiatric Association, 2013) which could impact a patient's ability to generate change talk in this population. Our study is the first to show that motivational interviewing has the same change talk augmenting effect in individuals with SMI as those without SMI. Given that anhedonia, negative affect and depressive symptoms are a major part of schizophrenia, schizoaffective disorder, and bipolar disorder (American Psychiatric Association, 2013), it is encouraging that MI can generate change talk in this

population. Another implication is the potential for MI to be added to other interventions developed for this population, such as being added as an adjunct to physical health care protocols for this population (Spoelstra, Schueller, Hilton, & Ridenour, 2014) or within cognitive behavioral therapy sessions (Marker & Norton, 2018).

Our study had a number of limitations. First, our sample was not very large and our overall number of quit attempts was low. This may have impacted our ability to find a significant mediating effect, although this cannot be confirmed. In addition, some of the tapes had poor audio quality. Although raters noted when the quality was extremely poor, it is possible that some of the language may have been misunderstood. However, our raters had good reliability (ICC = .73) so the chance of this is small.

Our decision to use the CLEAR to examine change talk had advantages and disadvantages. The advantages include: no need of written session transcripts for coding or extensive training (Glynn & Moyers, 2012), lower probability of rater errors because of its simplicity, and the ability to code a whole session in one passthrough. In addition, the CLEAR has been used in previous studies to successfully predict alcohol outcomes (Glynn & Moyers 2010; Moyers et al., 2007). One disadvantage, however, is that we were unable to test more granular hypotheses, because we could not breakdown change talk into specific subcategories or measure the strength of CT.

Future research should address the methodological limitations of the current study. Sessions should be recorded digitally to improve recording quality and ensure that minimal data is lost. Due to the overall low quit rate in populations with SMI (Grand, Hwang, Han, George, & Brody, 2007), larger samples may be needed to truly assess whether change talk has a mediating effect in this population. Future studies should also

investigate the effect of conducting multiple sessions of motivational interviewing to see whether this increases the number of quit attempts in this population. Finally, adding a continuous outcome measure, such as the average number of cigarettes smoked in the past week, to complement the categorical outcome measures, would allow us to perform a mediation analysis using linear regression which would potentially yield different results.

Future research should also investigate whether the therapeutic alliance is a mediator of treatment for individuals with SMI. The relational hypothesis of motivational interviewing (Miller & Rose 2009) suggests that the therapeutic alliance is a key factor in its efficacy, however studies have not shown support for this hypothesis (Magill et al., 2018). Nonetheless, it is possible that the therapeutic alliance is more important in generating change talk for those with SMI. Another question is whether severity of diagnosis moderates the amount of change talk and sustain talk produced, and whether the pattern of within-session change talk is different in seriously mentally ill populations. In conclusion, this is the first study to document the relationship between MI and change talk in individuals with SMI and highlights the need for more studies of change talk in this population.

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Table 1

Demographic characteristics within each treatment condition

Characteristic	Motivational Interviewing (n=41)		Interactive Education (n=41)	
Gender				
Female	46.3%	(19)	43.9%	(18)
Male	53.7%	(22)	56.1%	(23)
Race/Ethnicity				
Black	26.8%	(11)	31.7%	(13)
White	61.0%	(25)	56.1%	(23)
Latino	2.4%	(1)	9.8%	(4)
Asian	2.4%	(1)	0.0%	(0)
Other	7.3%	(3)	2.4%	(1)
Marital Status				
Never Married	73.2%	(30)	51.2%	(21)
Married	7.3%	(3)	12.2%	(5)
Separated	2.4%	(1)	9.8%	(4)
Divorced	12.2%	(5)	24.4%	(10)
Other or Unknown	4.9%	(2)	2.4%	(1)
Employment Status				
Unemployed	87.8%	(36)	92.7%	(38)
Employed Part-Time	9.8%	(4)	4.9%	(2)
Employed Full-Time	2.4%	(1)	1.2%	(1)
Type of Cigarette				
Ultra Light	4.9%	(2)	4.9%	(2)
Light	19.5%	(8)	12.2%	(5)
Regular	75.6%	(31)	82.9%	(34)
Flavor				
No Menthol	39.0%	(16)	36.6%	(15)
Menthol	61.0%	(25)	63.4%	(26)

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