Published in final edited form as:

Addict Res Theory. 2019 ; 27(2): 85–94. doi:10.1080/16066359.2018.1444159.

Feasibility and Acceptability of a Motivational Intervention Combined with Text Messaging for Alcohol and Sex Risk Reduction with Emergency Department Patients: A Pilot Trial

Nadine R. Mastroleo^{a,b}, Mark A. Celio^b, Nancy P. Barnett^b, Suzanne M. Colby^b, Christopher W. Kahler^b, Don Operario^b, Brian P. Suffoletto^c, and Peter M. Monti^b

^aCollege of Community and Public Affairs, Binghamton University, PO Box 6000, Binghamton, NY 13902

^bCenter for Alcohol and Addiction Studies, Brown University, Box G-S121-5, Providence, RI 02912

^cDepartment of Emergency Medicine, University of Pittsburgh, Pittsburgh, PA 15261

Abstract

Background—Interventions aimed at reducing co-occurring heavy drinking and risky sexual behavior among Emergency Department (ED) patients require feasibility and acceptability to optimally engage individuals.

Objectives—This pilot study explored the feasibility and acceptability of an interactive text-messaging (TM) supplement to a brief in-person intervention previously found successful in reducing alcohol use and condomless sex.

Methods—Using a mixed-method design, ED patients with past hazardous alcohol use and condomless sex ($N=20$) were randomly assigned to receive either a Motivational Intervention + TM or Brief Advice + TM. All participants completed exit interviews at four weeks follow-up, and transcripts were transcribed and coded to identify themes. We evaluated feasibility through quantitative assessment of TM response rates and latency to response, while acceptability was evaluated through thematic analysis of exit interviews.

Results—Findings provide support for the delivery of an integrated and personalized MI and TM. Participants engaged positively with the TM intervention and qualitative interviews offered strong support for the acceptability while offering information necessary to enhance the TM component.

Conclusions—Integrating MI with TM is feasible and acceptable to at-risk ED patients and could facilitate behavior changes beyond MI alone.

Keywords

Motivational Interviewing; Text Message; Alcohol; Brief Intervention; Emergency Department; Sex Risk

Excessive alcohol use and the negative consequences of drinking extend to sexual risk behavior where consistent evidence indicates an association between drinking and risk for HIV acquisition (Shuper et al., 2010). Reviews have called attention to the well-documented co-occurrence and reciprocal interactions between alcohol use and HIV risk behaviors in various high-risk populations (e.g., Bryant, 2006; Rehm et al., 2012; Woolf-King & Maisto, 2011). Patients who present to Emergency Departments (EDs) for care are an especially at-risk group. Previous studies have identified rates of around 10% of 18–65 year old ED patients screening positive for *both* hazardous drinking (i.e., positive AUDIT score and/or heavy drinking episode) and sexual risk behaviors (i.e., more than one current sex partner, sex without a condom, sex under the influence of alcohol/drugs) (Monti et al., 2016), while around 50% of ED patients who were under the age of 35 met these criteria (Mastroleo et al., 2015). These prevalence rates suggest a need to develop targeted interventions addressing both health risk behaviors simultaneously in this population (Fritz et al., 2010).

In-Person Alcohol Use and Sex-Risk Behavior Interventions

Randomized controlled trials have provided empirical support for the efficacy of brief in-person interventions for reducing heavy alcohol use and harm in ED patients (Longabaugh et al., 2001; Monti et al., 2014; Spirito et al., 2004) and for reducing HIV risk behaviors in a variety of populations and medical settings (e.g., Gilbert et al., 2008; Metcalf et al., 2005), but few studies have addressed both behaviors simultaneously. Two studies have examined the impact of a brief in-person intervention on alcohol and sex-risk reduction (Edelman et al., 2012; Monti et al., 2016). Edelman and colleagues (2012) found that their intervention produced reductions in alcohol use behaviors and increased condom use evaluated at 8-weeks follow-up. Monti and colleagues (2016) found that a Motivational Interview (MI) produced greater reductions in both alcohol use and condomless sex with a non-steady partner when compared to brief advice. The MI intervention focused on providing personalized feedback while aiming to enhance motivation to change high risk behaviors, where the BA offered information to the patient suggesting they were drinking at rates higher than health guidelines and engaging in HIV risk behaviors and advised them to reduce their alcohol use and use condoms. Both MI and BA have value in ED settings. Although MI shows more favorable outcome results, BA patients receive an intervention consistent with standard medical practice when alcohol problems or sex-risk behaviors are indicated, making the comparisons a more ecologically valid examination than assessment only. In this study, these interventions were limited by small effect sizes (e.g., Cohen's d : $-.12$, $-.17$), and this one-time in person intervention offered no opportunity for follow-up contact for behavior change maintenance (Monti et al., 2016). As such, additional efforts are needed to increase the intervention effect size and improve or maintain gains over time. Increasing the dose and/or contact time is one potential approach and the use of text messages focused on individual goals and behaviors is a method that offers promise for

longer-term risk reduction and implementation through low cost access and continued patient contact.

Mobile Technology Intervention Approaches

One way to extend and potentially amplify effects of in-person brief interventions for alcohol and sex risk is by adding intervention boosters (supplemental intervention content delivered to the patient after the initial contact). This may be especially pertinent for patients undergoing a brief intervention in the ED who may be distracted with other medical issues and may have difficulty remembering what was covered in the session. Some research has suggested one-time interventions could be enhanced through additional delivery of salient content (Donovan et al., 2015) however, there is a critical importance to choose feasible and low cost boosters for ED patients who may have limited access to resources (e.g., home computers) and no intentions to return to the ED for follow-up appointments. Text messaging (TM) is a ubiquitous and commonly used communication modality (Smith, 2011) that could be useful as a booster to in-person interventions. Stand-alone TM-based interventions have shown small to moderate effects in reducing alcohol use and alcohol-related consequences among young adult ED patients (Suffoletto et al., 2014, 2016) and preliminary supportive evidence of reducing condomless sex among both general pools of adults and young adult ED patients (e.g., Suffoletto et al., 2013). No study to date has tested a TM intervention that addresses both alcohol use and risky sexual behaviors concurrently.

In a recently published RCT, Suffoletto et al (2015) found that at 9-month follow up, when compared to baseline, young adults exposed to a TM intervention for reducing weekend alcohol consumption reported one less binge drinking day and a 26% reduction in the prevalence of any alcohol-related injury over the past month. A recent clinical trial conducted among young adult women in an ED found evidence of increased condom use with non-steady partners following TM (Suffoletto et al., 2013). However, the effect of TM-based interventions on condomless casual sex are mixed as testing and knowledge about sexually transmitted diseases were improved while condom use was unchanged (Lim et al., 2012). Past studies have used minimally tailored messages (i.e., previously developed messages that are sent to all participants) designed for a universal approach to reducing risk in identified individuals (e.g., Lim et al., 2012; Suffoletto et al., 2013). Two recent studies used a personalized message approach to offer the perspective of a helping relationship by incorporating the participant's first name and text messages based on previous survey responses (Haug et al., 2017; Mason et al., 2014). These messages, although specific for each individual, focused solely on alcohol use and targeted student populations. The combination of a platform of MI followed by tailored, personalized TMs focused on both alcohol use and sex-risk behavior reduction may enhance and sustain long-term health risk reduction effects, however the ability to deliver such an intervention and the receptivity of ED patients is unknown and in need of further study.

We designed a TM intervention that addresses both alcohol use and risky sexual behaviors concurrently. The TM intervention was primarily informed by the Theory of Planned Behavior (Ajzen, 1991) and self-regulation theory (Baumeister, 2003 ; Muraven et al., 2005). Specifically, it aimed to strengthen intentions and goal-directed behaviors related to

limiting alcohol consumption and using barrier protection when having sex. The behavior change techniques used in the TM intervention include self-monitoring, goal-setting, and feedback strategies, which have been shown to be effective components of mobile behavioral interventions for reducing alcohol consumption (Garnett et al., 2015).

In this study, we sought to evaluate feasibility and acceptability of a text message program that uses weekly TM assessments to guide personalized TM feedback aimed at reducing heavy drinking and condomless sex. Specifically, we approached our mixed-method design through Explanatory Sequential Mixed Methods (Creswell, 2014). We randomized eligible participants to a brief Motivational Intervention followed by personalized TM (MI+) or to Brief Advice followed by control TM (BA+). The design allowed for a comparison of two viable, easily exportable real-world interventions that vary in intensity and complexity (BA and MI). Quantitative outcomes included TM response rates and latency to responding. The qualitative interview assessed participants' subjective experience with the interactive TM program and provided suggestions for potential modifications to promote acceptability and engagement. Results from this study can provide greater understanding of how individuals perceive and respond to TM as an adjunct to MI and can inform intervention designs aimed at optimizing outcomes among at-risk ED patients.

Methods

Participants

Recruitment took place in a community hospital Emergency Department (ED) from January 2014 to April 2014. The target population comprised English-speaking patients age 18 to 65 who received medical care in the ED. Other eligibility criteria included: (1) hazardous drinking, defined as an Alcohol Use Disorders Identification Test (AUDIT; Saunders et al., 1993) total score > 8 for men; > 6 for women or reporting at least one episode of binge drinking (5 or more drinks for men; 4 or more drinks for women) in the past three months; and (2) reporting risky sexual activity during the past three months, defined as engaging in at least one of the following: condomless sex, having more than one sexual partner, or consuming alcohol or other drugs prior to or during sex. Patients in a mutually monogamous relationship for longer than six months and/or who did not have a verifiable phone contact with short message service (SMS) capability were excluded (18% of otherwise eligible patients were excluded for not having SMS). In addition, patients were not approached if they were being treated for an intentional self-inflicted injury (i.e., suicide attempt) or suicidal ideation, or if they were in police custody, as validity of self-report data may be compromised under these circumstances.

Four-hundred thirteen patients were approached in the ED and 310 agreed to be screened (75.1% of those invited). Of these, 44 (14.2%) were eligible and 22 patients (50.0% of eligible) enrolled. Two participants failed to complete the baseline assessments. Of the 20 who completed the baseline assessment, 10 were randomized to MI+ and 10 were randomized to BA+. An urn randomization program (Stout et al., 1994) was used to balance treatment conditions on specific variables (patient age, gender, education, race, AUDIT score, and past 3-month condom use). All 20 participants completed their assigned

intervention at baseline, 17 (85%) interacted with the TM protocol, and 18 (90%) returned and completed the one-month follow-up assessment and qualitative interview.

Procedures

Procedures were approved by the University and hospital Institutional Review Boards. Project staff worked on site in the ED to identify eligible patients and explain the study. Prior to consent, a mini mental status exam was conducted and a breathalyzer was administered to ensure that patients were able to provide informed consent.

Baseline assessment—Participants completed the assessment (approximately 45–60 minutes) using a laptop computer. Most measures were self-administered, with several administered in interview format by project staff to ensure accuracy. All measures were completed during, or within the two weeks following the patient's ED visit. Among those participants who did not complete the baseline assessment on the day of their ED visit ($n = 11$), the average number of days to completion was 7.73 days ($SD = 4.27$; Range 1 – 13 days). Following the baseline assessment, participants were randomly assigned to motivational intervention plus interactive text messaging (MI+) or brief advice plus control text messaging (BA+).

Motivational intervention plus interactive text messaging (MI+)—Participants assigned to MI+ completed a single-session brief intervention (approximately 60 minutes) with a research interventionist within two weeks of completing the baseline assessment. MI sessions were conducted in a private office in the ED. Using the principles of Motivational Interviewing (Miller & Rollnick, 2012), this session incorporated open-ended exploration, personalized feedback, and discussion about the patient's alcohol use, sex behaviors, and the potential consequences of these behaviors (e.g., exposure to HIV/STIs). For those interested in changing alcohol use and/or sex-risk behaviors, interventionists collaboratively established goals for behavior change in a written change plan. In addition, participants were offered condoms and given a list of local treatment resources (including HIV testing options; for a detailed description of the intervention see Monti et al., 2016).

During the session, participants collaborated with the interventionist to create up to 8 messages (4 focused on reasons to reduce alcohol use and 4 focused on reducing sexual risk). Interventionists encouraged participants to develop messages that would help them reach their goals for behavior change. These messages were typed into a secure website and stored with the patient's phone number as the sole identifier in an SQL Database on a firewalled server hosted by the University of Pittsburgh. Participants immediately received a series of welcome text messages describing what to expect in the following 4 weeks. They were also asked to "TXT us the word 'GO' now to confirm that this is your phone and you are willing to participate."

Starting on the following Thursday and Sunday, and continuing for a total of 4 weeks, participants interacted with the automated TM program. The program used timed schedules to send initial texts and limited natural language processing and branched logic to send further queries or provide feedback based on a patient's text. Each Thursday and Sunday at noon, participants received a text asking them whether they were "ready" to begin. This

procedure ensures that participants' phones are with them and that they are in a sufficiently private location to send and receive potentially sensitive texts. Once the program received a text response indicating that participants were ready, the series of alcohol and sex risk-related queries and feedback messages began.

Each Thursday, participants received a text stating: "Do you plan on drinking this weekend?" If they indicated they were not planning on drinking, the program sent them positive reinforcement on their plan (see Figure 1a). If the participants indicated they were planning to drink, they were queried about their potential for engaging in an unprotected intimate experience. We used this terminology based on preferences elicited in prior studies, and defined it both upon enrollment and throughout the TM program as "any sexual intercourse without a condom." If they indicated there was no chance of an unprotected intimate experience, participants then received a message aimed at promoting safe drinking (see Figure 1a). If the participant indicated there was a chance they would have an unprotected intimate encounter, they received a text from the panel of messages they had collaboratively generated in the MI session. For example, the message would start: "You told us that protecting yourself is important because..." If they did not generate any message during the MI session, they would receive a text reinforcing protection (see Figure 1a). This message would be immediately followed by a self-efficacy query (i.e., participants were asked about their confidence in following through with their plan) and tailored follow-ups based upon their response (see Figure 1a).

Each Sunday, participants received messages asking about their past weekend engagement in risky sexual behaviors and if alcohol was involved in an unprotected intimate experience (see Figure 2a). For any query sent on Thursday or Sunday, if a participant did not respond within 4 hours, a second text message repeated the initial message. If no response was received within 12 hours, the communication was discontinued and participants received: "Sorry we missed your response. We will check in later."

Brief advice plus control text messaging (BA+)—The BA+ intervention (approximately 5 minutes, in a private ED office immediately following the baseline assessment) was designed to closely reflect usual care at general health clinics. At baseline, participants were told they showed signs of risk associated with alcohol use, and that they reported recently engaging in risky sexual behaviors. The research interventionist informed the patient that reducing their alcohol use and using condoms was advised. These participants were offered condoms and given the same list of treatment resources as MI+ participants.

To control for text message contact with the study, participants were sent messages at noon on Thursdays and Sundays for 4 weeks. Study staff, rather than the automated system used in MI+, sent text messages to participants in the BA+ condition. The initial BA+ message asked whether the individual planned to drink and engage in risky sex. Participants were asked to reply to these messages using "yes" and "no" responses. Once participants responded, study staff replied thanking the patient for their response. No further interaction occurred between staff text messages and participants (see Figures 1b and 2b).

Follow-up—Follow-up assessments were conducted in person (approximately 60 minutes) by a project staff member at the end of the 30-day TM trial. All participants who presented for follow-up had a negative breath alcohol test. The assessment consisted of interviewer administered measures and a qualitative interview.

Compensation—Participants received \$35 after completing baseline, and \$40 for completing follow-up.

Measures

Screening—The AUDIT was administered as the primary measure for heavy/problematic alcohol use (Saunders et al., 1993). Recent research suggests a cut point of six or higher for women and eight or higher for men (Reinert & Allen, 2002) so these cut scores were used for study eligibility. Inclusion criteria for sexual risk-taking were based on items used to identify individuals at risk for HIV/STI transmission in previous research (Kalichman et al., 1998). The first item assessed the patient's total number of sexual partners (vaginal or anal sexual intercourse) over the past three months using an open-ended response. If the patient indicated having only one sexual partner, the second question assessed the length of the relationship. Three items evaluated sex-risk behaviors over the past three months, including: 1) frequency of condomless sexual intercourse (vaginal or anal); 2) frequency of consuming alcohol before or during sex; and 3) frequency of using any other drug before or during sex.

Demographics—Age, gender, race, ethnicity, years of education, and annual household income were obtained in a self-report questionnaire.

Alcohol Use and Sex Risk Behaviors—The Time-Line Follow-back for Substance Use and Sexual Behavior (TLFB-SS; Carey et al., 2001) is a structured, calendar-aided interview adapted from the Alcohol TLFB (Sobell & Sobell, 2003) used to retrospectively assess drinking and sexual behavior over the previous 30 days. Staff assessed the number of standard drinks consumed and any sexual behavior, each day. For days on which sexual activity occurred, participants were asked about partner type (steady, non-steady), partner gender (male, female), sex type (vaginal, anal-insertive, anal-receptive), and whether alcohol and/or drugs were consumed prior to sex. Alcohol indices included number of heavy drinking days (4/5 drinks for women/men) and average number of drinks per week. A sex-risk index derived was the number of days on which condomless vaginal or anal sex occurred with a non-steady partner.

Qualitative Interview—The semi-structured interview administered at follow-up assessed the feasibility and acceptability of the interactive text messaging intervention. The interview consisted of 13 open-ended questions, including the patient's typical text messaging use ("Please tell me about your usual text messaging use"), and her or his subjective experience with the interactive text messaging program (e.g., "What was it like for you to receive the study messages?", and "What aspects of the text messaging, if any, do you think [helped/did not help] you?").

Data Analysis Plan

Data analyses included quantitative evaluation of patient's responses to text messages and qualitative analyses of post-intervention interviews. The evaluation of participant response patterns included calculating text-message response rates and the latency to respond to the initial "ready" text, and to subsequent texts, separately by intervention group. To evaluate group differences on response rates, latency, and behavior change, we combined Sunday and Thursday responses and used generalized estimating equations (GEE; Zeger & Liang, 1986) using a binomial distribution for binary outcomes (e.g., response no/yes, Thursday plan to drink) and a normal distribution for continuous outcomes (latency to respond). Where relevant, we controlled for levels of baseline behaviors. Verbatim transcripts and summary notes from the qualitative interviews were reviewed independently by three members of the project team (MAC, SMC, and DO) who met in person to discuss overall impressions and specific responses. Analysis of patient feedback on the TM interventions sought to itemize each distinct limitation or weakness, and each distinct strength or contributor to acceptability. One member of the team (MAC) itemized all relevant quotes reflecting all positive versus negative responses about the TM interventions from each qualitative interview transcript. A second team member (SMC) confirmed the extracted data by comparing the list against the transcripts. Representative quotes were selected to comprehensively reflect the strengths and weaknesses raised in all interviews. These quotes were identified through discussion among MAC, SMC, and DO.

Results

Participants

The participants ($N = 20$) were predominantly women (70.0%). Twenty-five percent of the sample was Hispanic/Latino ethnicity; racially, 50% of participants identified as White, 30% Black/African American, 15% Multiracial, and 5% American Indian/Alaskan Native. Average age was 33.1 years ($SD = 10.2$) with a range of 21 to 54 years of age. Reasons for being in the ED were identified as illness (75%) and injury (25%). Level of education varied; 20.0% had not completed high school, 30.0% had a high school diploma or GED, and the rest (50.0%) completed at least some college or technical school. The average AUDIT score was 7.1 ($SD = 5.3$; range: 1–21). Participants reported engaging in 3.1 (BA+) and 6.2 (MI+) heaving drinking days, 7.5 (BA+) and 13.8 (MI+) average number of drinks per week, and 4.1 (BA+) and 0.4 (MI+) events of condomless sex with a non-steady partner over the past 30 days at baseline.

Response Rates and Latencies

Ready texts—With 10 participants in each group, four weeks, and two days per week, there were 80 possible "Are you ready?" texts sent to each group. Due to a programming error, nine of the 10 MI+ condition subjects did not receive one of two "Ready?" texts in Week 4, leaving 71 possible "Ready?" texts for that group. The rate of responding was 95.8%¹ in the MI+ group and 70.0% in the BA+ group, a significant difference (see Table

¹This may be an underestimate, as at least one of these was responded to by the participant but the automated text system was interfered with by advertisements so did not recognize the "Yes" text sent by the participant.

1). The nonresponding for these “Ready?” texts was primarily accounted for by three participants, none of whom responded to any texts, and all of whom were in the BA+ group. Although there were differences in responding rates to the “Ready?” text between conditions, the time to response did not significantly differ between conditions (33 minutes for BA+, 25 minutes for MI+).

Subsequent texts—After the “Ready?” text had been responded to, response to subsequent texts was excellent for both groups. There were 165 subsequent texts sent by the system, of which 162 (98.2%) received a response from participants. The latency to respond was very good, but was significantly different between conditions, with the BA+ group showing a slower response of 6.2 minutes ($SD = .29$) versus 2.9 minutes ($SD = .06$) for MI+. See Table 2.

Behavioral Responses

Thursday plans for drinking and unprotected sex—Four of the BA+ participants (range of 1–4 reports each; 9 out of 28 possible days) and six of the MI+ participants (range of 1–4 reports each; 17 out of 38 possible days) indicated on one or more of the Thursdays that they were planning to drink in the upcoming weekend. Controlling for baseline drinks per week, there was not a significant difference between BA+ and MI+ participants in the odds of reporting a plan to drink ($OR = 0.70$, 95% CI: 0.133 to 3.646, $p = .67$). Of the four BA+ participants who indicated they were going to drink, one reported there was a chance for unprotected sex (one report). Of the six MI+ participants who reported intentions to drink, two indicated there was a chance they would have unprotected sex (two reports).

Sunday report of unprotected sex and alcohol use before sex—Four participants (range of 1–3 reports; 8/28 possible days) in the BA+ group and two participants (1–2 reports; 3/28 possible days) in the MI+ group reported having unprotected sex over the weekend. With baseline number of condomless sex days controlled, this was a significant difference in the odds of having unprotected sex ($OR = 39.55$, 95% CI: 2.023 to 773.288, $p = .015$). One of the four participants in the BA+ group and one of the two participants in the MI+ group who reported having unprotected sex reported one time each drinking alcohol prior to the unprotected sex.

Qualitative Summary

Baseline text messaging use—Participants in this sample varied widely in their use of text messaging prior to intervention, with some estimating that they send or receive as few as two messages per day, and others estimating that they send or receive more than 200 messages per day. The majority of participants (61%) reported sending or receiving at least 50 messages daily. Text messaging use was comparable across conditions. Most participants (14 of 18; 78%) stated they preferred texting over talking on the phone. Participants who preferred texting cited convenience (e.g., “Sometimes you need to just make a statement to somebody, and you don’t know if they’re gonna answer the phone or call you back.”), simplicity (e.g., “[Texting is] short and simple. Sometimes you don’t want to talk to a certain person, because they talk your ear off.”), and privacy (e.g., “...if you’re trying to convey

something to somebody, and you're with somebody that you don't want them to actually know what you're doing.") as advantages of texting.

Study message satisfaction—Participants in both the MI+ and BA+ conditions expressed satisfaction with the timing of the study messages. The majority of participants (14 out of 18; 78%) found the Thursday/Sunday schedule was appropriate as it framed the weekend, when drinking and condomless sex are more likely to occur. Several participants stated the messages should be more proximal to their weekend activities, and suggested messages be sent on Friday and/or Saturday nights (e.g., "I would want something that texted me on Fridays, like before drinking time, and be like, [a] reminder to you know, don't overindulge in drinking."). With regard to TM duration, participants were generally satisfied with the one-month protocol. However, most individuals (50% of BA+ participants and 70% of MI+ participants) stated the duration of the protocol should be extended, specifically to meet the needs of individuals who require more time to change their drinking and/or sexual behavior (e.g., "I'd say maybe going more toward three months because I think you can make a lot of changes. You can make more changes over the course of three months. And also like, this month in particular there was a lot of birthdays, there was holidays, so there was more celebrating. So maybe you'd get a better, more real picture with three months.").

Participant feedback about MI+ texts—The majority (60%) stated the personalized messages (i.e., messages collaboratively developed with the interventionist designed to correspond with their individualized change plan goals during the MI) served as a reminder of the goals developed within their MI+ session, and prompted them to think about and plan for upcoming events (e.g., "It reminded you like, to be safe, you know... It mentioned how I don't like hangovers. Stuff like that. It wakes you up. I'll be like, Wow! This is true.") Participants in the MI+ condition noted the personalized messages helped them reflect on the initial MI session. When asked what about the TM was helpful, one patient in the MI condition stated, "Um...just reminding me that I have goals, and what not to do. Like, 'try to save money,' so I wouldn't go out and drink a lot." This example illustrates how personalized text messages drew upon goals set in the context of the MI session, and prompted participants to make behavioral changes in line with their own stated goals. Further, a number of participants felt the messages could be even more personalized, including using their name within the text message. Only one patient stated she would not want her name included, due to privacy reasons. No participants in the MI+ condition reported they experienced the messages as insufficient, generic, or predictable.

Participant feedback about BA+ texts—When asked to describe what it was like to receive the study messages, all participants in the BA+ condition stated that the program was easy to use. Half of the BA+ participants (4 of 8) stated the messages provided less information than they expected, describing the messages as "generic," "basic," "predictable," and even "boring." One participant described the process by stating, "I'd be surprised when I received the message... I didn't know when it was coming. And then the messages started to become the same. So I already knew what I was gonna be asked. It was starting to be like, predictable, basically." Generally participants stated they were interested in receiving more personalized messages. Further, despite the lack of personalization,

participants stated that the messages made them think about their behaviors and, “Just receiving the messages made me feel like someone cared.”

Discussion

The primary goals of this pilot study were to examine feasibility and acceptability of using an adjunctive TM intervention among the target population. While our experimental design included random assignment to two conditions (MI+ versus BA+), the design does not allow us to separate the relative effects of the base interventions (MI versus BA) from the potential adjunctive effects of TM on obtained outcomes. Therefore, while we present behavioral outcome data to fully disclose our results, these data are limited by small sample size and the confounding of base and adjunctive intervention conditions. Overall, the feasibility of adding TM to MI was well supported as the rates of responding to initial text prompts and interacting with the TM protocol were high. Further, the qualitative interviews offered strong support for the acceptability of the personalized message protocol delivered to participants in the MI+ condition.

TM Engagement

Results showed high rates of responsiveness to the text messages, in both the MI+ and BA+ groups, with even higher rates of responding to initial texts in the MI+ group and a shorter latency to response. From this we might conclude that there was greater receptiveness to the texts for the MI+ group than the BA+ group. This may have been related to the personalization of each message that was created in collaboration with the interventionist during the initial MI session or possibly the nature of the MI session and building a stronger relationship and rapport with the patient. This short latency to response offers support for the text intervention approach to reach participants in moments when they are available to respond and offers support for their interest in interacting with the system. Although the BA+ group had a longer latency to response to subsequent texts, the delay may have been caused by the lack of an automated system to deliver the BA+ messages, so we caution against making much of this group difference.

Acceptability

Through the qualitative interviews, the majority of participants indicated the twice weekly (Thursday and Sunday) delivery schedule was ideal; however some suggested tailoring message delivery so that TM would be received closer to a drinking or sex-risk event. This suggests participants may be more responsive to TMs that are personalized to the timing of their drinking events and sexual behavior. Further, the ability of participants to have the opportunity to request a message in real time may provide added benefit, as risky situations are not always predictable. Past research has offered support for smoking cessation text-based intervention approaches that offer immediate and added support for sticking with goals and reduction plans (e.g., Bock et al., 2013), increasing college students' readiness to change drinking (Mason et al., 2014), and reducing heavy drinking days (Haug et al., 2017). Finally, through the qualitative interviews, participants in the MI+ and BA+ conditions noted that receiving texts made them feel important and that someone cared. As noted, participants in the BA+ condition typically qualified the texts as “generic” and “boring.” Important to

consider when designing future studies, participants in both conditions did note that receiving the text messages made them consider their behaviors, suggesting the importance of using a true control condition with no text messages as a comparison group in future studies. When framed within the broader literature on TM approaches, our study mirrors past studies supporting feasibility and acceptability of using TM to address various health behaviors (e.g., alcohol, tobacco cessation; Bock et al., 2013; Mason et al., 2014). The current study indicates that this approach may be viable to use with adult ED patients who are not actively seeking treatment for alcohol or risky sex, yet are at high-risk for alcohol related problems and STI/HIV transmission.

Limitations

The limitations of this study are for the most part a function of its small size, including the lack of follow-up assessment beyond the end of the intervention and the small number of observations, which keeps us from being able to draw conclusions about group differences in behaviors. An additional limitation involves the assessment of condomless sex during the intervention. Specifically, on Thursday, the question about planning to have condomless sex was only asked when an individual indicated planning to drink, therefore we are unable to clearly determine the prevalence of plans for condomless sex independent of plans for drinking, and since the question about condomless sex was not asked on every Thursday, the correspondence between the Thursday plan and the Sunday report cannot be determined. Similarly on Sunday the question about recent alcohol use was only asked if the person reported having had condomless sex, so we cannot determine the prevalence of drinking in the sample or the correspondence between the Thursday drink plan and the Sunday drink report. As a result of the design, there were very few indications that participants anticipated having condomless sex, which meant we may have missed intervention opportunities. The purpose of the texting program was to address condomless sex in the context of alcohol use, so both Thursday and Sunday queries used branching logic to measure this specific behavioral relationship. This pilot revealed the limitation of that approach, which requires revision in future iterations. Additionally, texts to the BA+ condition were sent directly from a study RA manually using a project mobile phone (although participants were not aware TM were being sent from a study RA), which may have resulted in a slower response than from texts sent from the automated system. This approach to TM delivery would not be feasible in a larger scale study and would require an automated system to standardize TM delivery. Finally, although the qualitative methods were appropriate for this pilot study, a more rigorous thematic analysis should be used in a larger study. Specifically, a larger scale study would benefit from incorporating a deductive approach in which theme development could now be directed by existing concepts and ideas, or further through a realist or constructivist approach which both focus on reporting upon either an assumed or certain reality that is evident or created by the data (Braun & Clarke, 2006).

Conclusions

This is the first study to integrate a personalized TM program with MI with multiple-risk ED patients. The personalization of TM matches the MI approach of collaboratively identifying areas of change, setting goals, and working with patients to develop a plan. Engaging patients in developing personalized text messages has the potential to enhance intervention

effects, and may also strengthen the patient's interest in receiving the messages post-intervention, thereby increasing engagement in both the intervention protocol and an interest in behavior change. As alcohol-involved ED patients are a high-risk group for engaging in sex-risk behaviors (Mastroleo et al., 2015), this study addresses both a highly significant public health concern and also provides important evidence supporting the feasibility and acceptability of integrating MI and TM that could have broader treatment implications, including important considerations as to how this low cost and potentially effective intervention approach may reach a wider range of high risk patients at low human and financial costs.

Acknowledgments

This research was supported in part by the following NIH grants: R01AA009892. The authors would like to thank Carla Rich, Amanda Budziszek, and Jennifer Merrill for their work delivering the interventions to Emergency Department patients.

References

- Ajzen I. 1991; The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 50(2):179–211.
- Baumeister RF. 2003; Ego depletion and self-regulation failure: a resource model of self-control. *Alcoholism: Clinical and Experimental Research*. 27(2):281–284.
- Bock BC, Heron KE, Jennings EG, Magee JC, Morrow KM. 2013; User preferences for a text message-based smoking cessation intervention. *Health Education and Behavior*. 40(2):152–159. [PubMed: 23086555]
- Braun V, Clarke V. 2006; Using thematic analysis in psychology. *Qualitative Research in Psychology*. 3:77–101.
- Bryant KJ. 2006; Expanding research on the role of alcohol consumption and related risks in the prevention and treatment of HIV/AIDS. *Subst Use Misuse*. 41(10–12):1465–1507. DOI: 10.1080/10826080600846250 [PubMed: 17002990]
- Carey MP, Carey KB, Maisto SA. 2001; Assessing sexual risk behavior with the timeline followback (TLFB) approach: Continued development and psychometric evaluation with psychiatric outpatients. *International Journal of STD and AIDS*. 12(6):365–375. [PubMed: 11368817]
- Creswell, JW. *Research Design: Quantitative, Qualitative, and Mixed Methods Approaches*. 4. Los Angeles, CA: Sage; 2014.
- Edelman EJ, Dinh A, Radulescu R, Lurie B, D'Onofrio G, Tetrault JM, Fiellin LE. 2012; Combining rapid HIV testing and a brief alcohol intervention in young unhealthy drinkers in the emergency department: a pilot study. *Am J Drug Alcohol Abuse*. 38(6):539–543. DOI: 10.3109/00952990.2012.701359 [PubMed: 22794939]
- Fritz K, Morojele N, Kalichman S. 2010; Alcohol: the forgotten drug in HIV/AIDS. *Lancet*. 376(9739):398–400. DOI: 10.1016/s0140-6736(10)60884-7 [PubMed: 20650516]
- Garnett C, Crane D, West R, Brown J, Michie S. 2015; Identification of behavior change techniques and engagement strategies to design a smartphone app to reduce alcohol consumption using a formal consensus method. *JMIR Mhealth and Uhealth*. 3(2):e73. [PubMed: 26123578]
- Gilbert P, Ciccarone D, Gansky SA, Bangsberg DR, Clanon K, McPhee SJ, Gerbert B. 2008; Interactive "Video Doctor" counseling reduces drug and sexual risk behaviors among HIV-positive patients in diverse outpatient settings. *PLoS One*. 3(4):e1988.doi: 10.1371/journal.pone.0001988 [PubMed: 18431475]
- Haug S, Paz Castro R, Kowatsch T, Filler A, Dey M, Schaub MP. 2017; Efficacy of a web- and text messaging-based intervention to reduce problem drinking in adolescents: Results of a cluster-randomized controlled trial. *J Consult Clin Psychol*. 85(2):147–159. DOI: 10.1037/ccp0000138 [PubMed: 27606700]

- Kalichman SC, Tannenbaum L, Nachimson D. 1998; Personality and cognitive factors influencing substance use and sexual risk for HIV infection among gay and bisexual men. *Psychology of Addictive Behaviors*. 12(4):262–271.
- Lim MS, Hocking JS, Aitken CK, Fairley CK, Jordan L, Lewis JA, Hellard ME. 2012; Impact of text and email messaging on the sexual health of young people: a randomised controlled trial. *J Epidemiol Community Health*. 66(1):69–74. DOI: 10.1136/jech.2009.100396 [PubMed: 21415232]
- Longabaugh R, Woolard RE, Nirenberg TD, Minugh AP, Becker B, Clifford PR, Gogineni A. 2001; Evaluating the effects of a brief motivational intervention for injured drinkers in the emergency department. *J Stud Alcohol*. 62(6):806–816. [PubMed: 11838918]
- Mason M, Benotsch EG, Way T, Kim H, Snipes D. 2014; Text messaging to increase readiness to change alcohol use in college students. *J Prim Prev*. 35(1):47–52. DOI: 10.1007/s10935-013-0329-9 [PubMed: 24114551]
- Mastroleo NR, Operario D, Colby SM, Barnett NP, Kahler CW, Monti PM. 2015; Prevalence of heavy drinking and risky sexual behaviors in adult emergency department patients. *Alcoholism: Clinical and Experimental Research*. 39:1997–2002.
- Metcalf CA, Douglas JM Jr, Malotte CK, Cross H, Dillon BA, Paul SM, Group R-S. 2005; Relative efficacy of prevention counseling with rapid and standard HIV testing: a randomized, controlled trial (RESPECT-2). *Sex Transm Dis*. 32(2):130–138. [PubMed: 15668621]
- Miller, WR, Rollnick, S. *Motivational interviewing, third edition: Helping people change*. Guilford Publication: 2012.
- Monti PM, Colby SM, Mastroleo NR, Barnett NP, Gwaltney CJ, Apodaca TR, Cioffi WG. 2014; Individual versus significant-other-enhanced brief motivational intervention for alcohol in emergency care. *J Consult Clin Psychol*. 82(6):936–948. DOI: 10.1037/a0037658 [PubMed: 25111430]
- Monti PM, Mastroleo NR, Barnett NP, Colby SM, Kahler CW, Operario D. 2016; Brief Motivational Intervention to Reduce Alcohol and HIV/Sexual Risk Behavior in Emergency Department Patients: A Randomized Controlled Trial. *J Consult Clin Psychol*. 4(7):580–591.
- Muraven M, Collins RL, Morsheimer ET, Shiffman S, Paty JA. 2005; The morning after: limit violations and the self-regulation of alcohol consumption. *Psychol Addict Behav*. 19(3):253–262. DOI: 10.1037/0893-164X.19.3.253 [PubMed: 16187803]
- Rehm J, Shield KD, Joharchi N, Shuper PA. 2012; Alcohol consumption and the intention to engage in unprotected sex: systematic review and meta-analysis of experimental studies. *Addiction*. 107(1): 51–59. DOI: 10.1111/j.1360-0443.2011.03621.x [PubMed: 22151318]
- Reinert DF, Allen JP. 2002; The Alcohol Use Disorders Identification Test (AUDIT): A review of recent research. *Alcoholism: Clinical and Experimental Research*. 26(2):272–279.
- Saunders JB, Aasland AG, Babor TF, de la Fuente JR, Grant M. 1993; Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-- II. *Addiction*. 88:791–804. [PubMed: 8329970]
- Shuper PA, Neuman M, Kanteres F, Baliunas D, Joharchi N, Rehm J. 2010; Causal considerations on alcohol and HIV/AIDS--a systematic review. *Alcohol Alcohol*. 45(2):159–166. DOI: 10.1093/alcalc/agg091 [PubMed: 20061510]
- Sobell, LC, Sobell, MB. Alcohol consumption measures. In: Allen, JP, Wilson, V, editors. *Assessing Alcohol Problems*. 2. Rockville, MD: National Institute on Alcohol Abuse and Alcoholism; 2003. 78–99.
- Spirito A, Monti PM, Barnett NP, Colby SM, Sindelar H, Rohsenow DJ, Myers M. 2004; A randomized clinical trial of a brief motivational intervention for alcohol-positive adolescents treated in an emergency department. *J Pediatr*. 145(3):396–402. DOI: 10.1016/j.jpeds.2004.04.057 [PubMed: 15343198]
- Stout RL, Wirtz PW, Carbonari JP, DelBoca FK. 1994; Ensuring balanced distribution of prognostic factors in treatment outcome research. *J Stud Alcohol Suppl*. 12:70–75. [PubMed: 7723001]
- Suffoletto B, Akers A, McGinnis KA, Calabria J, Wiesenfeld HC, Clark DB. 2013; A sex risk reduction text-message program for young adult females discharged from the emergency

department. J Adolesc Health. 53(3):387–393. DOI: 10.1016/j.jadohealth.2013.04.006 [PubMed: 23707402]

Woolf-King SE, Maisto SA. 2011; Alcohol use and high-risk sexual behavior in Sub-Saharan Africa: a narrative review. Arch Sex Behav. 40(1):17–42. DOI: 10.1007/s10508-009-9516-4 [PubMed: 19705274]

Zeger SL, Liang KY. 1986; Longitudinal data analysis for discrete and continuous outcomes. Biometrics. 42(1):121–130. [PubMed: 3719049]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

a) MI+ condition protocol:

b) BA+ condition protocol:

Figure 1.

Flow chart depicting the Thursday text messaging protocol for a) participants in the MI+ condition, and b) participants in the BA+ condition

Note. Messages presented in *italics* represent sample personalized text messages that would have been developed in an MI+ session.

a) MI+ condition protocol:

b) BA+ condition protocol:

Figure 2.

Flow chart depicting the Sunday text messaging protocol for a) participants in the MI+ condition, and b) participants in the BA+ condition

Note. Messages presented in *italics* represent sample personalized text messages that would have been developed in an MI session.

Table 1**Text Message Response Rates and Latencies**

	BA+	MI+	OR/B	95% CI	p value
Response rate to first "Ready?" text on Thursday or Sunday	56/80 (70.0%)	68/71 (95.8%)	0.10	0.019, 0.535	.007
Latency to respond to "Ready?" text (in minutes; M [SD])	33.13 (47.23)	24.92 (35.73)	7.89	-12.37, 28.15	.45
Response rate to subsequent texts	72/73 (98.6%)	90/92 (97.8%)	1.58	0.17, 14.53	.68
Latency to respond to subsequent texts (in minutes; M [SD])	6.20 (0.29)	2.88 (0.06)	3.32	0.09, 6.55	.044

Note. On Thursday and again on Sunday "Ready?" texts were sent to ensure the participant was ready to respond and engage with the text messaging system. If the participant responded to the "Ready?" text, he/she was sent a subsequent text query about plans or behavior. Thursday and Sunday observations are combined and data are presented at the response level (not participant level). Analyses were conducted using GEE using a binomial distribution for response rate and a normal distribution for latency. For response rates, the analysis is reported as an odds ratio; for latency the analysis is reported as *B*.

Table 2

Text Message Responses collapsed across participants

	BA +	MI+	OR	95% CI	p value
Thursday drinking plan “yes” ^a	9 [#] /28 (32.1%)	17 [#] /38 (44.7%) ^b	0.70	0.13, 3.65	.667
Thursday chance of unprotected sex “yes”	1/9 [#] (11.1%)	2/17 [#] (11.8%)	0.61	0.04, 8.91	.71
Sunday did you have unprotected sex? “yes” ^c	8 [#] /28 (28.6%)	3/28 (10.7%) ^b	39.55	2.02, 773.29	.015
Did you use alcohol prior to sex? “yes”	17 [#] /28 (60.7%)	1/3 (33.3%)	0.35	0.01, 12.38	.56

Note. Shared superscript **symbols** show how the numerator in one cell is the same as the denominator in the next, since the second question was only asked if the first question was endorsed. Data presented are at the response level (not participant level). Statistical significance of between groups differences were tested with GEE using a binomial distribution. We controlled for baseline drinks per week in the analysis of drinking plan and baseline number of days of condomless sex in the analysis of unprotected sex.

^a 13 days were not collected because participants did not indicate “ready.”

^b One participant did not answer this item.

^c 14 days were not collected because participants did not indicate “ready.”