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UTILIZING QUALITATIVE METHODS TO INFORM INTERVENTIONS FOR
ADDRESSING ALCOHOL USE DURING PREGNANCY

A Thesis Submitted to the Yale University School of Medicine in Partial Fulfillment of the
Requirements for the Degree of Doctor of Medicine

by
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ABSTRACT

Background: In the United States, nearly 12% of women report alcohol use during pregnancy despite recommendations of complete abstinence by government agencies and professional medical organizations. Multiple public health and screening interventions are effective in promoting increased knowledge and abstinence amongst pregnant women. However, the interventions generally provide broad, non-specific content, and the messaging is not directly tailored to the specific motivations and barriers that women face when making decisions about alcohol use during pregnancy. Since tailoring content and messages can improve effectiveness of interventions, a deeper qualitative investigation into the context surrounding alcohol use during pregnancy is warranted.

Methods: We conducted qualitative 1.5-2hr focus groups in New Haven in order to better understand the reasons behind alcohol use during pregnancy. We also discussed the motivations as well as barriers women faced when attempting to abstain during pregnancy. We analyzed the focus groups in Dedoose using a grounded theory approach. Utilizing the discovered themes, we created, tested (using a survey) and elicited informal feedback on 12 preliminary text messages specifically addressing the concerns women brought up.

Results: Our qualitative study of 5 focus groups with 31 participants, aged 19-57, of whom 28/31 (90.3%) used alcohol during pregnancy, showed that alcohol use during pregnancy is a result of multiple biological, social, psychological and systemic factors. Themes of personal characteristics, social pressures, unmet mental health needs, and governmental concerns were pertinent in all questions asked during the focus groups. Participants also detailed specific techniques that they personally found helpful when attempting to abstain during pregnancy. In response to the preliminary messages, women found 5/12 (41.6%) messages to be effective and others to be neutral. They also provided invaluable feedback about modifying the language of the messages.

Conclusion: Based on the themes elicited, we propose a model that shows these factors serving as both promoters of alcohol use as well as barriers to abstaining. We detail specific points of intervention that can be targeted using text messages. We describe the approach of creating and improving the messages, based on participant feedback.

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INTRODUCTION

Epidemiology

Alcohol use during pregnancy remains a concern in the United States. On average, 12 percent of women report alcohol use throughout their pregnancy, while approximately 4 percent report an episode of binge drinking¹. Alcohol consumption is highest during the first trimester, a key phase for fetal neural development, with 19.6% of national survey respondents reporting current use^{2,3}. It decreases during the second and third trimesters to about 4.7% of respondents endorsing alcohol use². Despite public health campaigns and education against use of alcohol during pregnancy, the number of pregnant women reporting alcohol consumption over the past decade (2011-2018) has continued to increase^{1,4}. This trend mirrors an overall increase in high-risk drinking and alcohol use disorder observed among women in the United States⁵.

There are several characteristics associated with alcohol use during pregnancy. Studies show that socioeconomic and demographic factors such as marital status, ethnicity, education level, and income are correlated with alcohol use. For example, data analysis from the national Behavioral Risk Factor Surveillance System database (2015-2017) revealed the prevalence of current drinking and binge drinking amongst non-married pregnant women was significantly higher than those who were married⁴. Furthermore, women who identified as non-Hispanic reported higher prevalence of current drinking than those who identified as Hispanic⁴. In Japan, a large study of 91,828 indicated that women with high educational levels and household income were more likely to use alcohol prior to pregnancy awareness compared to those with lower education levels and income⁶. However, after pregnancy awareness, the relationship was inverse and lower education levels and household income was associated with higher prevalence of alcohol use⁶. Other studies also highlight that younger women with unintended pregnancies are more likely to use alcohol than those with planned pregnancies.^{7,8} In addition to demographics, concurrent drug use or smoking, history of inpatient treatment for drugs or alcohol, recent physical abuse as well as depression and other mental health disorders are linked with alcohol use

during pregnancy^{7,9}. Although there is an abundance of research that describes such population wide associations, studies aimed at understanding motivations behind alcohol use during pregnancy are limited. There is little known about the context surrounding alcohol use. Questions, such as “why are women with lower education levels and income at risk for alcohol use?” and “what barriers do they face when attempting to quit?” remain unanswered.

The increase in alcohol use amongst pregnant poses a significant concern as there is a strong link between prenatal exposure to alcohol and a range of disorders known as the Fetal Alcohol Spectrum Disorders (FASD)¹⁰. These disorders encompass fetal craniofacial and cardiac malformations, reduction in fetal brain volume, intellectual disability, problems with the child’s executive functioning, and fetal death¹⁰⁻¹⁴. Recent data from a multi-community studies suggests that prevalence of FASD in the United States ranges from 1.1% to 5% of all school aged children, which is significantly higher than previously estimated rates of occurrence^{15,16}. The continued high prevalence of alcohol use during pregnancy, as well as FASD, highlights a public health need that remains largely unaddressed.

Making the Shoe Fit: Broad Approach to Decreasing Alcohol Use During Pregnancy

While no studies reveal a safe amount of alcohol use during pregnancy, a pattern of binge drinking or heavy drinking is thought to be associated with FASD¹⁶. Since no strong evidence towards a safe quantity is known, public health information in the United States is geared towards complete abstinence. Several health organizations, such as Center for Disease Control (CDC) as well as American College of Obstetricians and Gynecologists (ACOG) recommend no alcohol use during pregnancy^{1,17,18}. There are also mass public health campaigns to provide information about alcohol use to pregnant women. Examples include government mandated warnings on alcohol containers, signs in restaurant and bars, as well as pamphlets and TV commercials^{19,20}. These broad campaigns and public health interventions effectively increase the knowledge about alcohol use²¹. For example, in a qualitative focus group study, a majority of participants were aware that alcohol could cause harm to the developing baby and were able to name specific

effects on fetuses, such as low birth weight and abnormal facial features. They also acknowledged that consumption during the first trimester would cause the most harm²².

While individuals may be knowledgeable about the repercussions of alcohol use during pregnancy, it is not known whether a significant increase in knowledge actually translates to a decrease in alcohol consumption itself. On the contrary, although knowledge increased after the introduction of warnings on alcohol containers, a time series analysis revealed that there was no actual decrease in drinking patterns, especially amongst heavy drinkers, such as those with alcohol use disorder, did not undergo change²³. One possible explanation is that, on an individual level, one can attribute this discrepancy in knowledge and action to cognitive dissonance, meaning that the thoughts of those with substance use disorders are often inconsistent with their behaviors or actions²⁴. To cope with an incongruity in their beliefs and actions, they often experience denial, which is a rejection of their actions or the risks associated with it²⁵. It is also possible that they consider their own behavior to be less problematic in comparison to others (majority fallacy)^{26,27}. In order to resolve the dissonance, they require interventions such as motivational interviewing to reflect upon their own behaviors²⁶. Another factor that may contribute to continued alcohol consumption in the face of knowledge is the biological nature of addiction itself. In a recent review, Kobb and Volkow detailed a cycle of addiction, which consists of three phases that ultimately lead to a dysregulation of the reward and stress pathways and perpetuates drug compulsive behavior²⁸. They state that the negative reinforcement of negative affect, i.e., decrease in unfavorable mood after consumption, often drives drug-seeking behavior²⁸. This phenomenon could be especially salient amongst women who often drink to relieve negative affect^{28,29}. For women who are pregnant and undergoing hormone fluctuations, mood changes, and stressful life events, using alcohol to alleviate stress may be even more pronounced³⁰. Thus, it is possible that women, especially those suffering from alcohol use disorder and addiction, may report an increase in knowledge about the negative consequences of

alcohol use during but would not be able to curtail their use without interventions, specifically catered to their motivations and situations.

Bringing the Shoe to You: Current Interventions

To address alcohol use on an individual level, ACOG details the importance of screening, identification, and referral for women who use alcohol during pregnancy in an effort to reduce negative health outcomes^{17,18}. There are several interventions that are in line with ACOG's goal of proactive identification and treatment that are effective. One such technique is the Screening, Brief Intervention, and Referral to Treatment (SBIRT), which identifies women at risk of substance use in a medical or non-medical setting, provides a single motivational session, and refers those at high-risk for substance use to treatment³¹. This intervention is effective and cost-efficient in reproductive health care centers³². A study implementing a variation of SBIRT in community settings but delivered by nonmedical professionals revealed that brief interventions were associated with greater abstinence and better fetal outcomes than control interventions³³. Furthermore, SBIRT can also be delivered successfully using an electronic platform³². A randomized controlled trial conducted by Martino et al. in 2018, determined that women who underwent SBIRT, electronically or in person, had significantly decreased days of primary substance use, including alcohol use, compared to those who did not. However, neither the electronic or in-person modality led to increased treatment utilization, which is consistent with well-documented low levels of treatment seeking behaviors amongst individuals with substance use disorders^{32,34}. The authors hypothesized about the barriers to accessing care, but the understanding of why women of reproductive age suffering from substance use disorders do not utilize resources is largely underexplored. In order to increase service utilization, it is pertinent to discover why women using alcohol during pregnancy are less likely to access care.

Another avenue of intervention that supplements electronic and in-person SBIRT is mobile health promotion through text messages. Given the rise of technology over the last few years, mobile messaging and apps for healthcare are gaining increased traction. Text messages

are low-cost and effective ways to deliver information, motivate individuals, as well as engage with underserved and/or non-treatment seeking individuals³⁵⁻³⁹. While randomized controlled trials testing messages about alcohol use during pregnancy are very limited, there are interventions utilizing text messages during pregnancy as well as for substance use outside of pregnancy. *Text4Baby* is an example of a text-messaging based intervention aimed at promoting healthy pregnancies and babies⁴⁰. It provides relevant, concise, pregnancy-related educational materials to expectant mothers through regular text messages and has a wide outreach particularly in underserved populations⁴¹. It is believed that getting exposure to useful messaging cultivates a sense of self-efficacy amongst women and leads to behavioral change that impacts health outcomes⁴⁰. A randomized pilot study evaluating *Text4Baby*'s effectiveness revealed that women who had exposure to the text messages were more likely to agree with the statement "drinking alcohol will harm the health of my baby" compared to those without the intervention⁴². However, the actual alcohol consumption was not recorded during the study, limiting the understanding of the impact on actual use during pregnancy. Furthermore, the study showed that women who were more educated are more likely to agree with the alcohol use statement regardless of time spent in intervention group⁴². It is possible that higher educated women were able to contextualize the information better, but it is also probable that the content itself was not targeted for women with less than a high school education. This highlights the need for creating motivational and educational content that encompasses all education levels, especially since women with less education report higher levels of drinking during pregnancy^{7,8}.

A similar randomized controlled trial for an intervention called *miQuit* sent messages to women encouraging them to quit smoking during pregnancy. Women who received the messages were more likely to report abstinence compared to the control group, which received only a pamphlet⁴³. The studies conclude that text messages can be an effective and cost-efficient way to reach a broad population. However, both studies provided generalized content, similar to material found in wide-range public health interventions and did not specifically tailor the messages to

participant characteristics. Literature consistently shows that targeting and tailoring mobile content to the consumer leads to most efficacious results^{38,44}. For example, a meta-analysis of smoking-cessation related mobile applications indicated that tailoring and targeting messages, providing peer or social support, and on-demand content to mobile phone users may increase the efficacy of the text messaging content³⁸. We can thus hypothesize that catering the content to the participant characteristics, such as health literacy, psychosocial circumstances, baseline alcohol use or participant goals, may lead to further substance use abstinence. However, this area of intervention creation and implementation remains relatively unknown.

One Size Does Not Fit All: Exploring Context Around Alcohol Use

One can imagine that a way to tailor messages for individuals is to work with those who will benefit from the messages and interventions. By getting to the core of what causes women to use alcohol and what challenges they face when attempting to quit, we can identify concrete and targetable points of intervention to reduce alcohol use during pregnancy. Focus groups are a qualitative research method that allow for exploration of people's knowledge, experiences, and to study "not only what people think but how they think and why they think that way"^{45,46}. Furthermore, within health-care related research, focus groups are helpful in studying the manner in which patients actively manage their conditions, develop strategies for dealing with their illnesses and share information with one another^{47,48}. For alcohol use during pregnancy, several focus group studies examined personal and structural factors promoting consumption and affecting abstinence^{30,49-51}. However, most studies were conducted abroad, thus, limiting their generalizability to the diverse population of the United States^{30,49-51}.

The dominant narrative in literature about alcohol use during pregnancy is that there is a lack of clarity about a safe amount during pregnancy as well as a lack of knowledge of consequences related to drinking. For example, a study from Sweden of 7 focus groups with 34 women showed that while women knew they had to abstain from alcohol during their pregnancy, they were unable to pinpoint specific consequences on the fetus and reasoned that consuming

alcohol early in the pregnancy was not harmful⁴⁹. Two studies from Australia, conducted by Anderson et al. and Meurk et al. shared similar results and concluded that in order for women to make informed decisions about alcohol use during pregnancy, healthcare professionals and public health messages need to share clear and evidence-based information about the effects of alcohol on the fetus^{50,51}.

Along with lack of knowledge about alcohol use, two studies pointed to other factors that contribute to alcohol use. A study from Australia with 5 focus groups conducted with 21 participants found that social influences contribute to drinking, such as feeling pressure from peers or family members to drink, especially by older generations who are not acquainted with the guidelines on alcohol use during pregnancy²². The authors and participants also mentioned the theme of motivation, describing stress as the key motivator for consumption and the health of the developing baby as the biggest motivator for abstaining²². Another qualitative study conducted in South Africa with 24 women expanded on this concept and concluded that women used alcohol to cope with stress, to maintain their social connection, to appease peers and due to addiction³⁰. The authors, Watt et al., called for approaches that address mental health and coping as well as “innovative interventions that go beyond the boundaries of the healthcare system” to address the problem of FASD³⁰.

While there are limited qualitative studies on alcohol use during pregnancy in the United States, it can be conjectured that lack of knowledge will play less of a role in consumption, given data that shows that public health interventions have increased knowledge but not impacted behaviors^{21,23}. However, the effects of stress, and social influences warrant further exploration in order to better tailor messaging.

Can Focus Groups Create Tailored Interventions?

Tailored messaging is “developing a specific, behavior-focused communication based on assessment of individual characteristics”⁵². Focus groups provide insight into pertinent characteristics and motivations and can guide which salient themes to address⁵². For example,

researchers in Miami developed an SMS intervention to prevent underage drinking by utilizing qualitative focus groups to determine the content, themes, and logistics of messaging⁵³. Focus groups can also be a place to receive feedback about existing messages and materials in order to iteratively improve the content and its delivery⁵⁴. A study conducted by Braciszweksi et al. in the United States did so successfully for a substance use reduction program for youth exiting foster care. They were able to test the acceptability and usability of their program while also gaining informative feedback on ways to modify content⁵⁵. Thus, it is possible to utilize focus groups to create tailored interventions, but their applicability to addressing alcohol use during pregnancy is not yet tested or proven.

In summary, alcohol use during pregnancy poses a significant public health concern. While there have efforts made at promoting generalized education and knowledge on the topic, the rates of alcohol use continue to rise, highlighting the need for more specific and catered interventions. Since research has consistently shown that tailoring messaging to individuals can improve outcomes, it is pertinent to further explore the motivations and barriers faced by women who use alcohol during pregnancy. Qualitative focus groups can be an effective way to elicit such information and shed light on themes that can be utilized to create innovative interventions. They can also be an avenue for obtaining feedback on content that best serves the population of interest.

STATEMENT OF PURPOSE

The goals of this thesis were four pronged:

- a) To conduct focus groups to understand the context of alcohol use during pregnancy. This included questions about perceptions of and motivations around alcohol use during pregnancy.
- b) To understand the barriers women face while attempting to quit alcohol use during pregnancy
- c) To utilize information extracted from focus group analysis to create motivational and tailored text messages for addressing alcohol use during pregnancy that will supplement e-SBIRT intervention in a randomized controlled trial.
- d) To gain informal feedback on text messages during focus groups

STUDENT CONTRIBUTION

The student was the lead on all steps of the research process for this thesis. She was involved in the conception of the idea and the methods. She conducted the literature review, wrote the IRB, and led the creation of recruitment material. In partnership with the research coordinator, the author was also directly responsible for placing flyers and conducting other recruitment methods including, but not limited to, meeting with the Women's Center staff for recruitment efforts. She was trained on moderating focus groups and moderated each of the five focus groups. She transcribed 3 of them. The author also directed the analysis team and individually coded each focus group. She is responsible for write-up of the thesis project and its future manuscripts in their entirety as well.

ETHICS STATEMENT AND HUMAN SUBJECTS RESEARCH

The protocol for the current study was approved by the Yale University Institutional Review Board (IRB) which considered this research to pose minimal risk to subjects. The study utilized a small sample, and the participants gave informed consent. The transcribed data was anonymized. The original recordings as well as all other subject data was stored according Yale privacy protocols. Results and quotes are all reported in anonymity.

METHODS

Sampling and Recruitment

The inclusion criteria for the study were: 1) being a woman who had used alcohol during pregnancy or had known a loved one who used alcohol during pregnancy; 2) being able to speak English; 3) not being institutionalized; 4) age 18 or older. The decision to include women who may not have had personal experience with alcohol use during pregnancy was due to stigma associated with the topic. The underlying assumption, based on discussions amongst research team, was that since women may not feel comfortable admitting to using alcohol during pregnancy, talking about a loved one or describing their own experiences under the guise of a loved one may lead to more honest conversation. Participants who did not meet the criteria, did not speak English (due to limited non-English speaking staff), or were under 18 were excluded from the study.

The team recruited participants through websites, predominantly Craigslist, and flyers placed in public places such as bus stops, bulletin boards, and the Women's Center clinic in New Haven (Supplemental Material A). The individuals interested in participating contacted the research coordinator, who screened them for the inclusion criteria on the phone. The screen focused on general health behaviors during pregnancy and was vague intentionally as to not influence people's answers (Supplemental Material B). The screened participants that met the inclusion criteria for the study were given a specific date and time for the focus group. Participants were only allowed to participate in one focus group.

At the time of arrival, the research coordinator or the moderator (author) consented each participant. They reviewed the goal of the study and described the logistics of the focus group (definition, timing, and presence of other participants). The consenting process included a discussion of risks and benefits, along with the voluntary nature of participation. Each individual was asked to keep the contents of the discussion group confidential and the procedures to

maintain anonymity and confidentiality by the research group were also detailed. The participants received \$50 and a parking pass or bus ticket as compensation for their time.

Setting

The focus groups occurred in a conference room at a central location in New Haven. Everyone sat in a circle around the table in order to make discussion easier. The moderator also sat at the table while an assistant moderator, when available, sat in the corner of the room to take notes. The moderator placed two voice recorders: one at the center of the table, and the second near the assistant moderator to ensure proper recording for transcription.

Survey

At the beginning of the focus group, participants filled out a 5-question demographic questionnaire (Supplemental Material C). The anonymous survey asked for information about age, number of past pregnancies, current alcohol use, self or loved one's alcohol use during pregnancy.

Qualitative Protocol

Our team consisted of a medical student, a research coordinator, an undergraduate student, an OB/Gyn resident, a qualitative research expert and a trained psychiatrist (PI). The team worked together to develop an open-ended moderator's guide for the focus groups through an iterative process (Supplemental Material D). The semi-structured guide drew influence from a review of prior studies exploring barriers surrounding alcohol use during pregnancy (cited in introduction) as well as questions about motivations around alcohol use posed by the team. The questions in the guide geared towards exploring women's perceptions and their motivations for using alcohol during pregnancy. The second half of the focus groups/guide contained questions about barriers women face when attempting to quit alcohol use, and factors that promote abstinence from alcohol, specifically during pregnancy. The guide also included a question that allowed participants to offer ideas for motivational text message content. The core questions of the guide were supplemented with spontaneous follow-up questions during the groups to allow

for a more robust discussion of relevant topics. Focus groups ranged from 1.5 hours to 2 hours, depending on the number of participants as well as the natural flow of conversations. The moderator (CA) facilitated discussion during the focus groups, and assistant moderators (when available) took observational notes at each session. We encouraged discussion for each question until no new views were expressed. We then transcribed each group from the audio recording.

For the last two focus groups, we generated text messages from the findings of prior groups. We presented the preliminary messages as a survey to the participants and asked for informal as well as formal feedback. We further describe the creation of text messages below.

Piloting Text Messages

Between each focus group, the PI, research coordinator, and medical student met to discuss the observational notes and transcripts. During these meetings, preliminary themes were derived based on the repetition of content present in the focus groups. The team also examined the text message suggestions by participants and classified them into 3 types of messages: gain-framed, loss-framed, or neutral. Gain framing messages were those that focused on a positive outcome of not using alcohol, whereas loss framing centered on the consequences of FASD⁵⁶. As requested overwhelmingly by participants, the team also created neutral messages that centered more on general pregnancy. Since loss-framing messages are not as effective and have shown to induce fear in readers, the team opted to only utilize positive and neutral messages^{56,57}. The medical student then utilized the preliminary themes and suggested messages to create a list of texts for testing at future focus groups.

During the last two groups, at the end of the core discussion, participants responded to an 8-to 11 question text message survey (Supplemental Material E). They rated the effectiveness of each message on a scale of 1-5 (1-not effective, 3-neutral, 5-very effective). After the survey, the moderator also informally gathered informal feedback about each message and took notes. For the last focus group, we modified the text messages based on the reviews received and asked for further comments. Since this was an informal discussion that promoted multiple conversations

around the table, this part of the focus group was difficult to interpret through the recording and not transcribed.

Analysis/Statistical Methods

Analysis occurred concurrently with data generation. The research team debriefed observational notes and thoughts after each focus group, and informally recorded general notes and themes. The team then transcribed the focus groups. After transcription, the group utilized a ground theory approach, which is an inductive process that relies on generating theories from the data through multiple iterations⁴⁵. In order to do so, the team underwent multiple analysis steps. Using Dedoose, an online coding program, CA, and the PI first independently reviewed and coded each transcript for prominent themes, line-by-line based on meanings, perspectives and actions they represented. The generated codes related to motivations for alcohol use during pregnancy, barriers women faced while attempting to quit, and potential areas of intervention and encouragement. Then, both coders performed intermediate consensus coding by examining each transcript, identifying themes, and reviewing discrepancies until agreement was reached. After several rounds of consensus coding, the author created a preliminary coding structure that was used for the remaining advanced coding. An independent single reviewer, JE, then reapplied the structure to the transcripts. Throughout the analyses, JE and CA had ongoing discussions to examine interpretations against one another until a final code was created. For the presentation of analyses and results, only themes and categories that were mentioned >2 times were included.

The team summarized the demographic questionnaire completed by the participants with descriptive analysis to gain an overall picture of the sample. We also analyzed the text message and graphed it as histograms using Excel.

RESULTS

Thematic saturation, defined as the point in data collection where only repetitive comments were heard and no new themes emerged, was reached after five focus groups with a total of 31 participants. Our participants were women from New Haven and the Greater New Haven area and were between the ages of 19-57. 28 of the 31 (90.3%) women had been pregnant before, and 17 (54.8%) of the women reported alcohol use during pregnancy. 27 (87.0%) of the women endorsed being close to someone who had used alcohol during pregnancy. The demographic information collected is further summarized in Table 1. Despite being asked on the questionnaire, the quantity of alcohol consumed during pregnancy was hard to ascertain due to discrepancies in standardization of quantity. For example, some participants reported their consumption in standard drinks, while others described quantity in colloquial terms.

The following 5 questions comprised the cornerstone of the focus group guide: 1) How do women perceive alcohol use during pregnancy? 2) What are the reasons for alcohol use during pregnancy? 3) What are the motivations for quitting or abstaining from alcohol use during pregnancy? 4) What are barriers to quitting alcohol use during pregnancy? 5) What are the techniques women use(d) to abstain from alcohol use during pregnancy? The last question was a result of the natural discussions during the focus group and was brought to the table by the participants themselves. It was not quantified but the overall themes of the discussions are mentioned below. The team chose these specific questions in order to understand the full context of alcohol use amongst women in the community, as well as to further inform areas that can be targeted by interventions, such as text messages and educational video content.

Table 1. Demographics – Focus Groups

	Group 1 <i>n = 8</i>	Group 2 <i>n=6</i>	Group 3 <i>n=6</i>	Group 4 <i>n=6</i>	Group 5 <i>n=5</i>	Total <i>n=31</i>
Age						
18-34	2	2	5	2	3	14
35-45	5	2	1	2	1	11
45+	1	2	0	2	1	6
Ever been pregnant?						
Yes	7	6	5	6	4	28
No	1	0	1	0	1	3
Number of prior pregnancies⁺						
1-2	3	2	2	1	2	10
3-4	3	1	2	1	2	9
5+	1	2	1	4	0	8
Number of children						
No children	2	0	1	0	1	4
1-2	2	2	3	2	3	12
3-4	4	3	2	4	1	14
5+	0	1	0	0	0	1
Alcohol Use during pregnancy*						
Yes	4	4	3	4	2	17
No	3	2	2	2	2	11
Alcohol use during pregnancy- loved ones						
Yes	7	5	6	5	4	27
No	1	1	0	1	1	4

⁺One participant did not disclose number of prior pregnancies

*Participants who did not report being pregnant did not answer question about alcohol use during pregnancy

Category 1: Perceptions of Alcohol Use During Pregnancy

Participants' responses to perceptions about alcohol use during pregnancy were overwhelmingly negative. Women cited alcohol as being "disgusting and just disgusting." These responses fell into two larger themes 1) negative comments pertaining to the individual and 2) overall, general negative perceptions of alcohol use. The results are detailed in Table 2.

We coded excerpts as the perceptions pertaining to the individual when a participant ascribed their understanding of alcohol use to a person's characteristic. For example, a few participants categorized the decision to use alcohol during pregnancy as "selfish." One woman stated that she would consider the woman using alcohol to be "on the irresponsible side" and

another called it “a selfish decision”. Few participants also considered pregnant women using alcohol to be in denial about having an addiction and about the effects of substances on the fetus. One participant commented, “no matter what you try to tell her to help with you know the situation, she still was in denial. In order to get help you’ve got to say that you’ve got a problem, and in her mind, she didn’t have a problem.”

Besides accrediting alcohol use to the individual, participants also discussed what they thought of alcohol use overall. Most participants extensively talked about the harmful effects of alcohol on the health of the fetus. They considered the act of drinking alcohol during pregnancy to be “risky, very risky” and described the consequences as children being born with “no nipples”, “low birth weights”, “shakes”, “ADHD” and “Downs’ Syndrome and autism”. While they rarely mentioned fetal alcohol syndrome, women described several anecdotal accounts of their own struggles raising children with developmental disabilities. One woman remarked on the difference between her children, and described the one born from her pregnancy with alcohol use as “alcohol has affected him... He’s just bad. He doesn’t listen, he’s very defiant. Like ADHD, ADD. He’s just terrible. I am sorry to say and I blame myself.”

Another subtheme that arose in the general perceptions of alcohol was its consideration as part of an inherited cycle. A few women described “alcoholism coming from generations”, and perceived alcohol use during pregnancy to be a product of “genetics” and imitation of behaviors modeled by family members such as mothers, fathers, brothers, and uncles.

Participants were also further probed about the source of their knowledge of alcohol use during pregnancy. They described multiple avenues of gaining information, such as signs in public places, TV and broadcast commercials, as well as through conversations with their physicians.

Table 2: Perceptions of Alcohol Use During Pregnancy, including themes and example quotes

Theme	Subtheme	Quote
Pertaining to the individual	Denial (n=3)	“But no matter what you try to tell her to help with you know the situation, she still was in denial. In order to get help you’ve got to say that you’ve got a problem, and in her mind, she didn’t have a problem.”
	Selfish (n=6)	“So drinking while you’re pregnant is sometimes, I feel like an act, because I did it, it was a selfish decision.”
General	Distasteful (n=9)	“I think it’s disgusting. Not trying to be so harsh (yeah, I am with you- another participant) but it’s like, um, disgusting and just disgusting. For myself, I feel. I mean I am not judging somebody else or someone’s friend but for me, it’s just like why?”
	Harm to baby/child and (n=20)	<p>“Her mother, my aunt, she drank vodka with her. She can’t have children. She can’t have children. All because her mother drank vodka every day. “</p> <p>“I am against but it is so risky you know, it is very risky, and if you don’t have that help and support, there is a chance that the child will come out deformed, with issues.”</p> <p>“Because people don’t realize that when baby is born with alcohol, that baby has the shakes, that baby, oh my god, it don’t grow properly, the brain don’t develop like it’s supposed to- it can have so many issues. And that’s what I was scared of. You know, enough that you are an alcoholic, but now your baby got Down’s Syndrome, or autistic. I work with those type of children. You can’t handle that.”</p>
	Inherited Cycle (n=3)	“And alcoholism comes from generations, it is a generational curse. Because I come from fish. That’s what we used to call alcoholics, they could drink like a fish. They can mix brown, white, and wine and not throw up a little bit. All of that is genetics. And people don’t even look at it like that. A lot of alcoholism, druggism, all of that is genetics stuff for us. Because we come from it. So they

		figure whatever we are made of, we will follow suit.”
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Category 2: Reasons for Alcohol Use During Pregnancy

During the analysis, three clear themes arose for reasons women cited using alcohol during pregnancy. Alcohol use was considered to be a product of an individual’s social environment, her personal characteristics and also, her unmet mental health needs. Examples of themes and quotes are listed in Table 3.

In terms of social environment, a few women stated that the reason for alcohol use lay in the families that women were born into. The families that they mentioned had prevalent histories of alcohol use. One woman described her family history as: “I was surrounded by alcohol my entire life. Everyone I know drinks. Everyone! Even as a child, I remember being constantly around alcohol all the time.” Growing up around alcohol directly impacted young women who looked to adults as “role models” and the examples they witnessed led to “drinking young, like at 14”, which then carried over into their pregnancies. In addition to their families, women were also impacted by their interactions with peers in their social groups. One woman described having friends who would “egg you on to drink” or peer pressure them into “taking a shot.” Along with peer pressure, some women also cited missing “hanging out with the girls and going out to the clubs” as reasons for using alcohol during pregnancy.

While there were instances of specific interactions pertaining to alcohol, social environment also indirectly influenced alcohol use by an absence of social support. Women admitted that having “no family support” or a community that aren’t really “friends” often promoted alcohol use in women who were already “under a lot of stress”. One woman phrased it as: “If you have mother or father that does not support you, and they don’t want you to have that child...the vibes is kind of different because on top of you being pregnant and all the hormones, you are getting bad vibes from your own family that is supposed to love you regardless...Stuff like that kind of pushes you. Even if you are not doing drugs or anything like that, it pushes you

to like think otherwise.” In these cases, even if there was not a history of alcohol use in the family, feeling lonely and unsupported motivated the women to use alcohol.

Besides external social pressures, an individual’s characteristics also played a role in reasons for alcohol use during pregnancy. One of the reasons mentioned by some of the participants was excessive use prior to pregnancy. “When you have a drinking problem, it’s hard to stop drinking, just because you find out you’re pregnant,” one woman commented, which was accompanied by nods of agreement by the group. Another commonly stated reason was unintended pregnancy. When women did not know they were pregnant, or did not expect to get pregnant, they were more likely to continue drinking alcohol. Along a similar vein, a few women also described the inability to visualize the fetus as a contributor to alcohol use. “If it’s not tangible, and in our hands, or we can’t see it, it’s not there. Especially when addiction is holding prevalence over there,” one woman described. In the instances where the woman could not “feel the baby”, the physical withdrawal symptoms and desire to drink alcohol would prevail. The last personal characteristic mentioned by participants was asserting independence, especially in the face of instruction. The women who mentioned this described “wanting to prove a point” by drinking alcohol when being told to “stop drinking”, especially during pregnancy.

The last theme that arose within the focus groups was alcohol use as a consequence of unaddressed trauma or unmet mental health needs. Stressors were the most commonly mentioned reasons for alcohol use during pregnancy. “The stressors of our day-to-day life is real. So, even though, yes, the pregnant woman, we feel like they should take priority, the baby should take priority, it’s not there,” one woman emphatically stated. This sentiment of stress driving alcohol use was thought to be further exacerbated by lack of healthy coping mechanisms. When women were stressed during pregnancy and did not have “support” or ways of “dealing with it”, they were more likely to drink. The third most common factor within this theme that contributed to alcohol use, according to some participants, was depression or other mental health conditions. One woman even stated that her “depression” is what “triggered the drinking during (the)

pregnancy.” The last subtheme was past trauma. A few women commented that their trauma is what caused them to use alcohol and addressing it could have prevented their alcohol use.

Table 3: Reasons for alcohol use, including themes and example quotes

Theme	Subtheme	Quote
Alcohol use as a product of social environment	Family history or experiences with alcohol use (n=7)	<p>“A lot of it has to do with family as well. Because with my friend who drank, she didn’t see anything wrong with it. Her mother did it, she saw her aunts do it. You know, it’s a generational thing. Like they raised their kids to do things a certain way. So she didn’t see anything wrong with it”</p> <p>“A friend of mine her mother is an alcoholic too. So when she was pregnant her mother would say oh come over and lets have a drink. So that’s not a good role model.”</p>
	Interactions with others who drink (n=5)	<p>“Another one for instance, if a young woman is young and gets pregnant she is missing hanging out with the girls, and going out to the clubs. And she can be sitting on the couch watching a movie, and it is a movie of the girls going out and drinking and it is just like, maybe I can just have one drink.”</p> <p>“You have that friend that will egg you on, and then you have the one that will say “No, she don’t want to drink.” You know what I mean. Like, “leave her alone.” Then, there are others who say, “So, what, take this shot.” You have friends like that. They don’t care. They don’t care if you want to do better, they don’t care. So I feel like that plays a big hand in it too.”</p>
	No support from loved ones (n=5)	<p>“She has a healthy child now, but her first pregnancy, she drank pretty much the entire pregnancy. Um, she was under a lot of stress, she didn’t know how to deal with it. She had a lot going on. No family support. Nothing.”</p> <p>“If you have mother or father that does not support you, and they don’t want you to have that child, it’s kind of like, the vibes is kind of different because on top of you being pregnant</p>

		and all the hormones, you are getting bad vibes from your own family that is supposed to love you regardless. You know? Stuff like that kind of pushes you. Even if you are not doing drugs or anything like that, it pushes you to like think otherwise. You know?"
	Boredom (n=3)	"I mean it wasn't a day or two. Could have been a couple hours. Like oh, I am going over to (friend who doesn't drink)'s house. Just to get away. And then I am like, eh, this is boring. I mean there's only so many times you can go watch Lifetime movies or something. You know what I mean? It's just like eh, eh."
	Lack of awareness of the risk of drinking (n=3)	"I really wasn't like educated on the risk factors of (<i>drinking</i>), with my other child (<i>the pregnancy she drank alcohol during</i>)."
Alcohol use due to personal characteristics of the mother	Excessive use before pregnancy/ Addiction (n=14)	<p>"But sometimes, when you have a drinking problem, it's hard to stop drinking, just because you find out you're pregnant. It's like with any addiction. You can know you're pregnant but if you're to the point, where you're drinking everyday, your mind is not even- You're not even thinking with a clear mind."</p> <p>"I would think, maybe it would start before they were pregnant. That they were drinking before. That they would just continue. That's just my opinion; I don't know maybe someone just got pregnant- I am having cravings for alcohol- I don't know if that's the case. But I would think that it would probably be someone who was already drinking first that would keep on drinking. And you know, have a hard time stopping."</p>

	<p>Unintended or unexpected pregnancy (n=9)</p>	<p>“I actually found out I was pregnant 3 months into my pregnancy. So up until 3 months, I didn’t know so I was like drinking and stuff”</p> <p>“well, you’re pregnant!” Yeah, 17 weeks. I was like “what?!” So, at that point, you know, it was like, oh my god. Because within that time frame, I did a lot. I drank, I did smoke weed, I did some other types of drugs and so forth.”</p>
	<p>Do not want to be told what to do (n=4) Oppositional behavior</p>	<p>“‘You need to stop.’ Nobody wants to hear that. Who are you (<i>general</i>), because you never drunk in your life, telling me no. I have to stop drinking? You don’t even know how it feels to drink.”</p> <p>“You’re still drinking? I thought we already talked about this.” That’s going to make the person mad. In fact, yesterday, I was going to the store and I asked my boy’s father do you want a beer? And my son looked at me and said, you better not drink. First of all, I’m a grown up. I’m going to drink if I want to. Don’t ever think that you can tell me not to... and I caught myself just wanting to prove a point, I almost bought liquor.”</p>
	<p>Pregnancy duration (visualization of the baby) (n=3)</p>	<p>“If its not tangible, and in our hands, or we can’t see it, its not there. Especially when addiction is holding prevalence over there. Because that shaking, that withdrawal, is there, we can feel it. We can’t feel the baby yet, in the beginning. And its not real, even though it is real. Our emotions are real. Our shaking is real.”</p>
<p>Alcohol use as a consequence of unaddressed trauma and unmet mental health needs</p>	<p>Depression/other mental health conditions (n=7)</p>	<p>“And what triggered the drinking during my pregnancy was, it was stress, depression, my relationship ended, shortly after I conceived with her, due to his infidelity. And I lost my mother, a month after that”</p>
	<p>Lack of coping strategies (n=13)</p>	<p>“My friend, she was just like “I don’t want to feel what I am feeling. This is the only way I know how to make it go away.” And I was like yeah, but it’s only going away temporarily.</p>

		<p>When you wake up tomorrow, you're going to feel that all over again. I was like let's tackle THAT, that you're feeling. But some people just don't wanna (#9: deal with that), just don't even want to go there. She was like, "I don't even want to deal with it"</p> <p>"She has a healthy child now, but her first pregnancy, she drank pretty much the entire pregnancy. Um, she was under a lot of stress, she didn't know how to deal with it. She had a lot going on."</p>
	Stressors (n=14)	<p>"So if a woman is already stressed out, she got this, this and that going on, her family's over here saying you're not going to be this this and that, that one drink can help relax them"</p> <p>"The stressors of our day-to-day life is real. So, even though, yes, the pregnant woman, we feel like they should take priority, the baby should take priority, its not there. You know what I mean?"</p>
	Past trauma (n=5)	<p>"And she was already drinking because of, she had a child but the child before that passed away. So she started drinking then. So, it wasn't like, you know, she was like, Oh, I'm going to wake up and become an alcoholic. She had, you know, there was trauma in her life. So, its like, if they would have stepped in and tried to help treat her trauma, it would have been easier to go back and try to help with that, and then go forward."</p>

Category 3: Motivations to quitting or abstaining from alcohol use during pregnancy

The motivations to quit seemed to fall within two major themes: desire to live differently and passive change in environment. Example quotes for each are in Table 4.

The desire to live differently generally resulted from guilt over behaviors, previous events in their lives or for the betterment of their children. Some women stated that they stopped drinking because they "hit rock bottom." One described it as "I just stopped...because I knew I

was getting in a lot of fights...my life wasn't going nowhere. It was just getting worse and worse." They also described health problems or hospitalizations as being major events that prompted abstinence from alcohol use. One participant recalled that she "almost died from alcohol poisoning." A few women also mentioned that alcohol use during their own or their loved ones' previous pregnancy drove their inclination to not drink or to quit during pregnancy. One woman vividly described her experience with a previous birth: "That's what it took for me. It took the premature birth of my daughter, the emergency C-section. It took that for me not to drink in other pregnancies." Another subtheme within the desire to live differently was motivated by their children, unborn and prior. The effect was often described as sudden. One woman stated, "I'm telling you my first child was my savior because I was, immediately, the day I found out I was pregnant, it was Christmas eve, I'll never forget it, and I quit drinking."

The second major theme was a passive change in environment that promoted quitting or abstaining from alcohol use during pregnancy. Since participants' social environment contributed to alcohol use during pregnancy, some women said a change in social situation assisted them in their motivations to quit. For example, one woman described that having a partner who "works every single day and is positive" or has an optimistic outlook on life made the difference in her pregnancies. She transformed from using alcohol while living with the unsupportive partner during her first pregnancy to quitting smoking as well as drinking during her latter ones. Within the realm of the change in social situations was also an increase in direct positive support. Some women mentioned that having friends or "positive people, people who were living a positive lifestyle, who weren't drinking" made an immense difference in keeping them away from alcohol use during pregnancy.

Table 4: Motivations to quitting or abstaining from alcohol use during pregnancy, including themes and example quotes

Theme	Subtheme	Quote
Desire to live differently	Guilt over behavior/hitting rock bottom (n=9)	"I just stopped drinking because I knew I was getting in a lot of fights. I knew I lost my child. Just like she (<i>another participant</i>) was saying, my

		life wasn't going nowhere. It was just getting worse and worse."
	Health problems/ Hospitalizations (n=7)	"For me, I was in the hospital because I almost died from alcohol poisoning. So, that's what made me stop."
	Impact of other pregnancies (n=7) Includes previous pregnancies as well as loved ones' pregnancies	"That's what it took for me. It took the premature birth of my daughter, the emergency C-section. It took that for me not to drink in other pregnancies. Because, I mean, it was, they were, they were just crazy. My daughters are actually 11 months apart. So, like right after that one, I was like, oh god, I am pregnant again. So, you know, but, it took that for me to not. Because my situation hadn't changed in 11 months. You know what I mean? Like it hadn't gotten that much better, I was still stressing. But when I saw the damage I did to my child and possibly could have lost my own life. That's what made me- I just couldn't take another drink with my child."
	Changing lifestyle (n=3)	"I really had a desire to change and live different because my life went totally down, you know, on the account of drinking"
	For children (n=12)	"But after I found out I was pregnant I stopped drinking like completely. Because I know all the effects and stuff with the baby and I didn't want nothing to happen to my son. I wanted him to come home healthy, and actually bring him home because you know some people do have babies but their babies don't make it through that process. So I didn't want that." I'm tellin' you like, my child was my savior. I'm telling you my first child was my savior because I was, immediately, the day I found out I was pregnant, it was Christmas eve, I'll never forget it, and I quit drinking."
Change in environment	Change in social situations (n=5)	"But with her, I stopped and like I did drink a little bit, but I had a totally- her father is totally different. You know what I mean? He actually works every single day and is like positive. We're

		still together now. Total different pregnancy. Total different pregnancy. So, but I stopped and I stopped smoking cigarettes. Yes, I did. I just didn't. It wasn't like..."
	Increase in positive support (n=10)	<p>"So, for her second pregnancy, she made sure she had support. Um, everything under the sun to make sure she didn't have to go through that again. She didn't want to go through that again."</p> <p>"I didn't wanna experience what I experienced with my birth with her (<i>previous pregnancy</i>) so whenever I had anything that was stressful, I made sure I tried to surround myself with positive people, people who were living a positive lifestyle, who weren't drinking. So, you know when I was with those people who didn't allow drinking or who didn't drink, that helped keep from being in an environment where I was able to drink. So, that kinda helped me a little bit"</p>

Category 4: Barriers to quitting during pregnancy

In the focus groups, women also described barriers that they faced when attempting to quit alcohol use during pregnancy. Similar to the reasons that caused women to use alcohol during pregnancy, the barriers fit the themes of individual's personal characteristics and external factors. Results are further described in Table 5.

Within the internal characteristics, the most mentioned trait (by 11 women) was a lack of baseline desire to change. Women commented that in order for someone to successfully quit during pregnancy, they have to want to do so. One woman described her friend's experience with not being to quit alcohol. "In order to get help, you've got to say that you've got a problem, and in her mind, she didn't have a problem," she stated. This comment was supported by the group, who described similar experiences and stories. Another barrier mentioned by a few women was immaturity or young age. Participants believed that young age made it difficult for a woman to successfully abstain. One participant remarked that quitting "is all about sacrifice. And a lot of

mothers are not going to sacrifice because mentally she is too young.” Another stated that younger mothers-to-be were more likely to miss “hanging out with the girls and going out to clubs” once they became pregnant, and that fear of missing out would prevent them from quitting alcohol use. Lastly, a few women also discussed addiction and withdrawal symptoms as being an internal barrier to quitting. They described “body aches” and shakes, which would not occur if the pregnant woman continued to drink.

Within external factors that posed as barriers, a negative social environment was most consistently mentioned across focus groups. Women who were unable to quit often described being surrounded by people who “encouraged it” and instead of saying, “you shouldn’t drink”, promoted it. This was especially a barrier when women had female role models, such as aunts and mothers, who would “invite” them over for a drink during pregnancy. In addition to people actively being a hindrance to women’s goals, a lack of support system was also a barrier. One woman stated that having “no support system, no one to sit you down” to remind you not to use alcohol. The women especially impacted were those with poor coping mechanisms, and increased stressors in their life. Lastly, another distinct concern mentioned by a few women was concerns with child protective services (DCF in CT). One woman mentioned that she wanted to quit. However, she stated that she couldn’t because “DCF had removed” one of her babies. She commented, “So even though I was pregnant, in my mind, I was like, they’re just going to take this one too. Who cares? It’ll just go away. It’ll just go away.”

Table 5: Barriers to quitting during pregnancy

Theme	Subtheme	Quote
Internal Characteristics of the person	Addiction/withdrawal symptoms (n=5)	“And my biggest thing is alcohol. If I don’t have a drink, my body aches”
	Baseline desire to change (n=11)	“In order to get help you’ve got to say that you’ve got a problem, and in her mind she didn’t have a problem.”
	Immaturity/young age (n=9)	

		<p>“Another one for instance, if a young woman is young and gets pregnant she is missing hanging out with the girls, and going out to the clubs. And she can be sitting on the couch watching a movie, and it is a movie of the girls going out and drinking and it is just like, maybe I can just have one drink.”</p> <p>“it (<i>not drinking</i>) is all about sacrifice. And a lot of mothers are not going to sacrifice because mentally she is too young.”</p>
External factors	DCF concerns/DCF as a trigger (n=5)	<p>“That was one of the reasons I was drinking with my daughter. Is because DCF had removed my baby, my boy. And they had no grounds to take him, and they took him and put him in the system. So even though I was pregnant, in my mind, I was like, they’re just going to take this one too. Who cares? It’ll just go away. It’ll just go away”</p>
	Impact of female family and friends (n=4)	<p>“A friend of mine her mother is an alcoholic too. So when she was pregnant her mother would say oh come over and lets have a drink. So that’s not a good role model.”</p>
	Social Environment (n=11)	<p>“With me, it was the same. Instead of people saying, “You shouldn’t drink” or “We know you’re stressed, we know what you’re going through, but you shouldn’t drink”, they encouraged it. “Let’s go get something to drink”. They encouraged it, like you said, the environment.”</p>
	Lack of support system (n=8)	<p>“But that’s the thing too she has no support system. No one saying sit your dumb self down and I will get you a sandwich, take a shower, and we will watch this movie.”</p>

Category 5: Techniques for quitting

During the conversations, focus group participants discussed ways to abstain from alcohol use during pregnancy. There was a wide range of suggestions, and several of the

suggestions directly tackled the barriers mentioned during the focus groups. Similar to the themes in previous categories, women discussed both internal (related to self) as well as external techniques that had helped or could help them in quitting alcohol. The results are described in Table 6.

The methods that pertained to the individual herself included management of mental health needs such as development of coping skills or getting connected to counseling/therapy as well as other support groups. Of note, several participants mentioned that being able to discuss alcohol use in the focus group format felt therapeutic. They commented on feeling heard, and desired more group settings like this for women, especially pregnant women struggling with alcohol use. Women also discussed other self-care techniques such as mindfulness, spa days, and yoga. They detailed ways to distract themselves and described ventures like painting your room or tending to pets to avoid thinking about alcohol and curb boredom. One woman revealed that religion and turning her life over to God helped her through her most difficult moments with alcohol use. While most women overwhelmingly supported these positive techniques, one discussed “using other substances, such as marijuana”, as ways of quitting alcohol use. Another described slowing down alcohol use and cutting back as ways of quitting during pregnancy.

Participants also commented on the influence of changing your surroundings in order to bolster efforts to abstain. One mentioned avoiding friends who use alcohol and “go to the club” to prevent temptation to do the same. One recommended that women who want to use alcohol should have family members who do not support the behavior, by not providing housing or having the woman committed, as ways of discouraging alcohol use. Women also agreed that they would like better explanations about alcohol use and its consequences on pregnancy from their physicians.

Table 6: Techniques for Quitting

Personal/Internal Techniques	External Techniques
Development of coping skills Counseling Distraction Self-Care Slowing/reducing use over time Turn life over to God Using other substances- ex: marijuana Support group	Avoid friends who drink Better explanation from physicians Coercion/legal action

Text Message Survey:

In the last two focus groups, participants responded to a pilot survey of text messages and rated messages on a scale of very ineffective to very effective. One of the focus groups had 8 messages to rate, whereas the last focus group responded to 7 of the same messages as previous group, in addition to 4 new ones. The text messages are listed in Table 7. The results and counts of each message are described in Figure 1. Overall, participants stated that they appreciated the messages. There were 5 messages that were particularly effective, defined as majority of participants responding either “effective” or “very effective”. The rest of the messages were considered largely neutral by the groups.

Participants also provided informal feedback for the messages. For example, one noted that providing the actual name of resources to connect to in message #1 (Table 7) could lead to a stronger and more convincing text. Another commented on the use of the word “beautiful” in message #2, stating that it can be a triggering phrase for victims of abuse. She recommended replacing it with characteristics of strength instead, such as “You’re worthy” or “You’re capable”. Participants advocated for a shift towards mother-centric messaging. Message #7, which received an array of responses, could be rephrased as “What healthy thing are you going to do today for you and your baby?”. Women noted that the baby itself can a source of stress, which can contribute to further alcohol use. There was also an inclination towards broader messaging relating to health, rather than targeted messages related to alcohol use. For example, women recommended replacing message #7 with “your baby loves you for who you are” or “your baby is

excited to meet you”. Participants also made recommendations for other accessible techniques in message #6, such as deep breathing and walking outside to get fresh air. Lastly, women also stated that including images, gifs, and media could add to the effectiveness of the messages and aid in communication.

It is also important to mention that a few women mentioned including negative imagery or messages as ways to convince women to abstain from alcohol use. They suggested utilizing images of children suffering from FASD and scare tactics. Prior studies have shown that loss-framing messaging, such as that mentioned by the few participants, can cultivate fear⁵⁶. Thus, due to foreseeable harm, those messages were not tested.

Table 7: Sample text messages

No.	Message Content
1	You don't have to feel like you're alone. There's somewhere you can go
2	Hello! Remember that you're beautiful. You matter.
3	Today, your baby is the size of an orange
4	Hello! There's a little person growing inside of you and you are very strong!
5	What healthy thing are you going to do today for your baby?
6	(Take your mind off of your troubles) and try some yoga today!
7	Your baby thanks you today for not drinking!
8	Good morning! Have an awesome day!
9	Not sure you can say no if others ask you to join them for a drink? Some moms plan ahead with answers like “No thanks, I'm stopping for my baby.”
10	Instead of drinking when bored, try something else. How about making or shopping for something for your baby?
11	You mentioned you would feel healthier by not drinking alcohol. Having a healthier body can mean more energy to enjoy life!
12	We know what you're going through is difficult, but this baby can be a new start

Figure 1: Survey responses to messages, rated on a scale of very ineffective to very effective.



DISCUSSION

To our knowledge, this study is one the first in the United States to explore alcohol use during pregnancy in such depth using qualitative methods. It is also one of the first to utilize direct input from focus participants to create motivational text messages. The main findings and implications of the work are described in detail below.

Public Health Messaging and Its Impact

Our focus groups showed that participants were generally aware of the negative consequences of alcohol use. They also perceived the behavior as being overwhelmingly negative and selfish, as deduced by the themes and sub-themes in Category 1. A majority described or concurred with statements about physical deformities in children born to mothers who used alcohol during pregnancy and discussed the everlasting impact of intellectual disability and behavioral problems. When probed about the source of their information, participants credited seeing commercials, signs in buses, and conversations with physicians. Our findings, thus, were consistent with prior studies that have shown the effectiveness of public health interventions, such as commercials and accessible signage, in raising awareness and knowledge about alcohol use during pregnancy in the United Staes¹⁹⁻²¹.

This finding differs from results similar qualitative studies conducted in Australia, which showed that women were not fully aware of the negative consequences. In contrast to our study, participants in prior literature considered drinking alcohol during pregnancy, specifically wine, to be a low-risk activity, and had low levels of anxiety about the impact it may have on the fetus^{50,51}. Based on participant responses, the authors recommended that physicians provide better and more concise guidance about alcohol quantity and impact to address a lack of knowledge^{50,51}. In our sample, that was not the case, which may point to the effectiveness of physician counseling and public health interventions in the United States. Furthermore, the theme of specific quantity

or type of alcohol for safe use was not a significant factor and only noted twice throughout the five focus groups. Therefore, it was not included in the analysis.

The Need for More than Knowledge to Create Behavior Change

Discussions in the focus groups revealed that despite knowing the negative effects of alcohol use, and perceiving the practice as harmful, a majority (54.8%) admitted to using alcohol during pregnancy themselves. While they freely talked about their own experiences in a factual manner, they usually described others' experiences and general views of alcohol in a negative light. It is possible that excluding themselves from the unfavorable repercussions and views was a way for them to address their own cognitive dissonance. This phenomenon is well reported in literature pertaining to addiction and the psychological discrepancy is often coped with denial and the majority fallacy²⁵⁻²⁷. In other words, while participants believed practice of using alcohol is problematic, they were in denial of their own behaviors and considered them to be not nearly as wrong as their peers or majority of others^{26,27}. Given the prevalence of cognitive dissonance and denial, it is particularly important to employ techniques of motivational interviewing and self-reflection in order to promote true behavior change^{26,31,32}.

While interventions such as SBIRT³², which utilize motivational interviewing, have proven to be effective in increasing abstinence amongst women, our focus groups also highlight the need for addressing other factors besides cognitive processes that contribute to alcohol use. In all categories of questions, the themes of internal characteristics and external factors contributing to alcohol use or barring abstinence permeated the discussion. Women vividly described their alcohol use as a culmination of multiple personal, social, and biological factors. Similar to prior studies in Australia and South Africa, women in our focus groups who considered alcohol to be a crucial part of their social life had a more difficult time abstaining^{22,30}. Women described growing up and being surrounded by alcohol use, and distinctly cited feeling left alone by friends and family for not drinking alcohol. They used alcohol as a coping mechanism in order to deal with stressors, similar to studies cited above. Given the pervasive mention of multiple factors, it is

important to consider alcohol use as a result of biological, social, and psychological factors that promote use and dissuade abstinence. Utilizing the themes extracted, we propose a model that can be used to further understand alcohol use as a construct of various factors during pregnancy (Fig 2.).

Addressing Alcohol Use During Pregnancy: Holistic Approach

In the model, we hypothesize that a woman's decision to drink rests in a complex matrix of biological factors, social support systems, psychological difficulties, and broader systemic issues. The model is similar the biopsychosocial model previously proposed by George Engel in 1977 who advocated that to understand disease, one has to examine not only the biological factors but also psychological and social ones⁵⁸. This model has been further expanded and explored in addiction literature⁵⁹. A systematic review examining alcohol use relapse showed that biological (young age, comorbidities), psychological (major life events, poor coping), and social (support systems) factors were associated with higher rates of relapse⁶⁰. The review also found that spirituality played a role in whether an individual relapsed or not. Similarly, a study examining opioid use found that all three types of factors significantly contributed to whether an individual used and misused opioids⁶¹. These findings are particularly pertinent for women as research has shown that compared to men, women who suffer from addiction and relapse are more likely to do so due to multifocal affect and interpersonal problems⁶².

We expand on the original biopsychosocial model by representing each factor independently with citations of themes from the results of our focus groups. We also include a broader systemic factor, focusing more on governmental influences that do not neatly fit the other three categories. For each factor (biological, social, psychological, and systemic), we describe the themes that promoted alcohol use (blue arrow) as well as those that posed as barriers and prevented abstinence (red arrow). For example, the participants described that women who used alcohol excessively prior to pregnancy were more likely to continue that use. Conversely, those women biologically at risk for consumption during pregnancy would also face a more difficult

time abstaining due to a higher chance of experiencing unpleasant withdrawal symptoms. We also model a similar relationship for social factors. Women who had a family history of alcohol use disorder and grew up around role models who engaged in unhealthy drinking behaviors were more likely to consume alcohol during pregnancy. Conversely, a lack of support or presence of peer pressure also doubled up as a barrier when attempting to abstain. Of note, DCF and systemic concerns in our focus groups were only brought as a barrier to abstinence. Their role as promoters of alcohol use during pregnancy needs to be further explored.

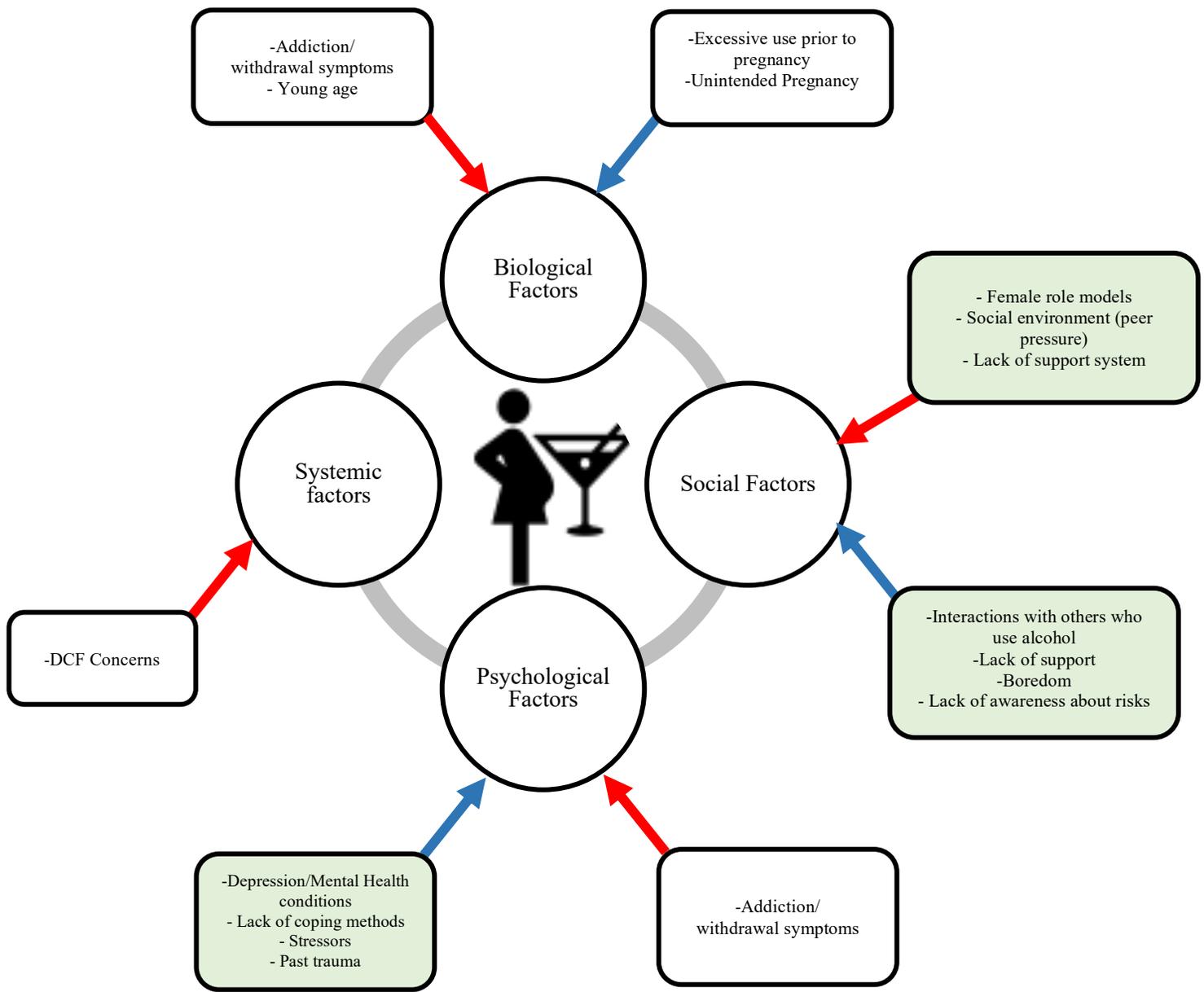
We can infer from the model as well as techniques recommended by participants for quitting that addressing alcohol use during pregnancy will require targeting multiple factors. When recounting motivations for abstaining, women described changes in social environment and previous personal experiences. Thus, it is pertinent that along with confronting denial through motivational interviewing and screening, women also get care for their psychiatric disabilities (connect with counseling), receive resources to develop better coping strategies and create new social networks. Furthermore, by delving into specific motivations and barriers faced by women during a critical time of pregnancy, this study and model adds to the emerging literature that advocates for holistic, gender-specific interventions for addressing substance use⁶³.

Points of Intervention: Text Messages

While all the factors, especially sweeping systemic changes are difficult to target using cost-effective and accessible mobile interventions, we use our model to display specific points where interventions can come into play (boxes highlighted green). Social factors and psychological factors, which were also most prevalent in the focus group discussions, can be targeted with text messages. Text messages can: be supportive and motivational, provide clear and concise information, and be interactive, directly addressing some of the barriers mentioned³⁵⁻³⁹. For example, to mitigate the social factors, motivational messaging can be utilized to provide support. Women in the focus group recommended encouraging messages, such as “you are strong”, or “you are amazing!” as ways to lend support to women who would otherwise feel

alone. Other examples for addressing social factors include using messages to suggest activities for combatting boredom tailored to the participants' interests, education about facts related to alcohol use, connection to local services and telling stories of women who have successfully abstained from alcohol during pregnancy. Similarly, messages can also be tailored to motivate women suffering from stressors and mental health disorders by providing examples of coping mechanisms and giving information about treatment resources nearby. Our results support that women believed the supportive messages could be effective in motivating women to abstain from alcohol. We also found that through the process of feedback acquisition, we were able to modify as well as tailor messages to the participants' needs and interests. However, the effect of the messages on actual abstinence needs to be further tested (described below – Future Considerations).

Figure 2. Addressing Alcohol Use During Pregnancy



Flipping the Narrative: Focus on the Mother

Another salient point from our data was that women often credited their children as being primary motivations for abstaining from alcohol. These results are similar to those reported in prior qualitative studies as well²². However, when testing messages, we noticed that while children were powerful motivators, few women felt that becoming perfect for the unborn baby

often placed unnecessary pressure on the mother-to-be. They described feeling unloved and unseen when the focus was only on the child. Thus, for text message creation, they recommended baby-focused messages mostly for tracking growth and pregnancy facts. They wanted the supportive messages to be mother-focused, i.e., “what are you going to do for your health today?” instead of “what are you going to do for your baby today?”. These messages could foster self-efficacy amongst participants and potentially lead to meaningful behavioral change. While a similar finding of cultivating self-efficacy was seen in the *Text4Baby* mobile intervention⁴⁰, its applicability to alcohol use during pregnancy still is relatively unexplored.

Strengths and Limitations

Despite the public health concern posed by alcohol use during pregnancy and FASD in the United States, to our knowledge, there are very few qualitative studies conducted to directly elicit motivations and challenges women face. As with any study, our findings should be considered in the context of our study’s limitations. First, we recruited participants from New Haven/Greater New Haven area and our sample was, thus, limited to the residents of the area. The findings of the study, therefore, cannot be broadly applied to all populations. However, this was one of the first qualitative studies conducted on the subject in the United States and thus adds a novel perspective to be considered amongst existing work. Secondly, since focus groups promote an in-depth participation and require participation in front of others, it is possible that our study was susceptible to social desirability bias⁶⁴. It is conceivable that some participants may have expressed views in line with social standards, in order to avoid presenting themselves negatively. To mitigate the potential for this bias, we allowed women to share perspectives from themselves and those they knew, as well as established rules of confidentiality at the beginning of the focus group. We also encouraged equal participation of all group members to limit one voice dominating and swaying the conversation. Lastly, given the qualitative nature of the study, we did not collect extensive demographic information on the participants, including their education status, which could have helped shape the language of the messages. However, to ensure that

messages were accessible, we kept the language intentionally simple in order to appeal all education levels.

Future Considerations

The qualitative focus groups allowed a robust discussion of factors that contribute to as well as prevent alcohol use during pregnancy. We created examples of messages that addressed some of the concerns voiced by the participants, thus, tailoring it to the needs of women who had used alcohol during pregnancy. The goal of future work is to devise similar motivational messages and tailor them even further to women who suffer from mental health conditions or social struggles discovered in the focus groups. While the feedback was encouraging, the messages need to be further tested to determine whether they impact abstinence. Thus, these messages will be incorporated into a multi-study randomized controlled trial supplementing SBIRT. Study participants will be randomly assigned to a group, one of which will be receiving SBIRT and tailored text messaging. The rates of abstinence and adverse maternal as well as fetal outcomes will be assessed to determine whether tailored text messages can be effective for supporting SBIRT and addressing alcohol use during pregnancy.

CONCLUSIONS

Alcohol use during pregnancy is a serious public health concern that has remained largely unaddressed. While population-wide studies have discovered socioeconomic and demographic associations and public health campaigns have led to an increase in knowledge about the harmful effects of prenatal alcohol exposure, little is known about the context and reasons for alcohol use during pregnancy. The motivations and barriers that women face when making decisions about alcohol use during pregnancy remain understudied. Research also increasingly shows that text messages are a convenient way to reach individuals and that tailoring text messages to the consumer can lead to more effective interventions and behavior change. However, the creation of such messages for alcohol use during pregnancy has not been trialed. This study, therefore,

addresses this gap in current literature and interventions. Through qualitative focus groups, we discovered that alcohol use during pregnancy rests in complex net of biological, psychological, social, and systemic factors that promote use and prevent abstinence. We found that on an individual level decision-making is based on these major themes and interventions are needed in all four arenas in order to create meaningful change. Based on the results, we determined that text messages can be used to address social factors, such as lack of support, and can also alleviate some psychological concerns through reference to counseling and coping tips. Using this overarching model of alcohol use derived from the focus groups, we created and tested text messages that were catered to our population. Overall, women found the messages to be effective or neutral, and recommended changes that led to further improvement and tailoring of the message content. While this study was qualitative and limited to New Haven, it provided a novel perspective and utilized innovative methods to create interventional material based directly on participants' input and feedback. The messages created will now be tested as a supplement to the SBIRT intervention and their effect on abstinence during pregnancy will be extensively studied in a multi-site randomized controlled trial.

FIGURE REFERENCES AND LEGENDS:

Figure 1: Survey responses to messages, rated on a scale of very ineffective to very effective. # of people represented on y-axis.

Legend: **green outline of box** represents text messages where # of individuals who thought message was effective/very effective > neutral/ineffective/very ineffective

Figure 2. Addressing Alcohol Use During Pregnancy, depicting four factors that contribute to alcohol use (biological, social, psychological and systemic)

Legend:

- Blue arrows – link constructs from data that promote/are reasons for alcohol use during pregnancy to the associated factor
- Red arrows – link constructs from data that are barriers to abstinence during pregnancy to the associated factor
- Highlighted green box – constructs that can be addressed using mobile interventions

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SUPPLEMENTAL INFORMATION

A. Example of flyers used for recruitment

Did you or anyone you know drink alcohol during pregnancy? Focus group to Help Us Improve Support for New Moms!

- ◇ This is a **one-time, 1 ½ hour-long focus group** study to learn about barriers and challenges women face when making decisions to use alcohol during pregnancy.
- ◇ The information we learn will be used to create motivational text messages that will be sent to women to encourage them to not drink during pregnancy.

You will receive \$50 for your time.

Groups forming now for November and December, 2018!

Call RUTH at (203) 764-7629

Yale School of Medicine

Email RUTH.ARNOLD@YALE.EDU or Text: (475) 441-3744

HIC#: 2000023473

B. Script utilized for screening women for the study

Hi, I am _____ and I am a research assistant at _____. We are assembling a group of women to speak about health habits in pregnancy for a study, including what motivates them to practice healthy habits and what makes it difficult. It will be a focus group, which will take 60-90 minutes. A focus group consists of a 1-2 facilitators and 6-8 participants talking about some common issue. Do you want to find out if you are eligible? (If yes, read script)

This is a one-time, 1 ½ hour-long focus group study to learn about barriers and challenges women face when making decisions to use alcohol during pregnancy.

The information we learn will be used to create motivational text messages that will be sent to women to encourage them to not drink during pregnancy.

I would like to ask a few questions, just to see if you meet the criteria for the study. They are related to health habits during pregnancy. Is that okay?

1. When you saw the ad about drinking during pregnancy, were you thinking about yourself or someone else? (if someone else, was it a family member or friend?)
2. Did you or someone you know take prenatal vitamins in pregnancy?
3. Did you or someone you know exercise during pregnancy?

4. Have you or someone you know ever used alcohol intermittently (now and then) to continuously (consistently) during pregnancy? (If yes, next question)
- a. Could you tell me a little bit more this?
 - i. Was it yourself or someone else? Who?
 - ii. How frequent was the use during pregnancy?
 - iii. Did use vary across the pregnancy? If yes, in what ways?
 - iv. What types of alcohol?
5. Would you like to participate in a project that we are conducting?
- a. We are able to compensate participants \$50 for their time and travel to a group discussion about pregnancy and health habits.
 - b. If yes, give information sheet and obtain contact info – Name/email/phone
-
-
-

6. We are trying to find the best time that works for most of the group. Which dates and times would you be available?

Date:	Time		
	10-11:30	1-2:30	3-4:30
Monday, 8/13			
Tuesday, 8/14			
Wednesday, 8/15			

Thank you so much for taking the time to talk to me. (If eligible and interested in participating)
We will be in touch shortly!

C. Demographic Questionnaire

What is your age? _____

Have you been pregnant before? _____

If so, how many times? _____

How many children do you have? _____

Did you use alcohol during pregnancy? Y / N

If Yes, on average, how much alcohol did you drink during pregnancy per week?

Do you currently drink? Y / N

If Yes, on average, how much alcohol do you drink during the week? _____

Do you know someone who used alcohol during pregnancy? Y / N

If Yes, on average, how much alcohol did that person drink during pregnancy per week?

D. Focus group Script

Opening Question: Tell us your first name, what your favorite color is and what you like doing in your free time.

Introductory Questions:

- During this focus group, we will be asking questions about alcohol. To start off, we just wanted to get to know what kind of alcohol you drink?
 - How often do you usually drink?
 - What do you like about it?
 - In what kinds of situations (parties, after work) do you find yourself more likely to drink?
- Have you ever felt the urge/need to quit?
 - What kind of information did you receive if you tried?
 - What are your perceptions about quitting? (We know it can be very difficult and really do appreciate you sharing your thoughts!)

We will be shifting gears now a bit and specifically asking questions about alcohol use during pregnancy. These questions will pertain to you or someone you know, who used alcohol during pregnancy.

- Alcohol use during pregnancy means different things for different people. What would you/your friend think of when someone mentions “using alcohol during pregnancy”?
 - Before or during your/your friends’ pregnancy, did you hear about it from anyone else?
 - Who?
 - What did that person/ those people tell you about it?
 - How did your personal experience or your friend’s with alcohol use shape your opinion?

Key Questions- Now, I would like to ask more questions specifically about your or your friend’s alcohol use during pregnancy

- What motivated you/your friend to use alcohol during pregnancy?
 - What specific moments can you think of where you/your friend had an urge to drink or did actually drink?

- What barriers and challenges did you/your friend face when trying to not drink alcohol?
- In times where you/your friend had the urge to drink but didn't, what happened?
 - What changed you/your friend's mind about drinking?
 - Was there something people said that led you/your friend to not drink during pregnancy?
 - What did you/your friend do instead? / How did you/your friend keep your mind off of drinking?
 - If you/your friend completely quit for your pregnancy or for a time during pregnancy, what was the reason?
- At those moments of urges, what could someone say to you/your friend that would make you not want to consume alcohol?
 - What kind of motivational things would you/your friend like to hear?
 - What would you/your friend not want to hear?

Ending Question:

- Out of the things that we have talked about today, what is one thing you/your friend would most definitely want someone to tell you about alcohol use during pregnancy?

OR

- We want to create messages that motivate women. What is one sentence that we could say or text you/your friend that would make you/them work really hard to not drink while pregnant?

*Summary: *summarize**

- Did we miss anything?

E. Text Message Survey

Please rate the following text messages on a scale of 1-5 :

You don't have to feel like you're alone. There's somewhere you can go.
(Real text would include name of resource)

1	2	3	4	5
Not effective		Neutral		Very effective

Hello! Remember that you're beautiful. You matter.

1	2	3	4	5
Not effective		Neutral		Very effective

Today, your baby is the size of an orange!
(This text will depend on the size of the baby)

1 **2** **3** **4** **5**
Not effective **Neutral** **Very effective**

Hello! There's a little person going inside of you and you are very strong!

1 **2** **3** **4** **5**
Not effective **Neutral** **Very effective**

What healthy thing are you going to do today for your baby?

1 **2** **3** **4** **5**
Not effective **Neutral** **Very effective**

Take your mind off of troubles and try some yoga today!

1 **2** **3** **4** **5**
Not effective **Neutral** **Very effective**

Your baby thanks you today for not drinking.

1 **2** **3** **4** **5**
Not effective **Neutral** **Very effective**

We know what you're going through is difficult, but this baby can be a new start.

1 **2** **3** **4** **5**
Not effective **Neutral** **Very effective**

Not sure you can say no if others ask you to join them for a drink? Some moms plan ahead with answers like, "No thanks, I'm stopping for my baby."

1 **2** **3** **4** **5**
Not effective **Neutral** **Very effective**

Instead of drinking when bored, try something else. How about making or shopping for something for your baby?

1 **2** **3** **4** **5**
Not effective **Neutral** **Very effective**

You mentioned you would feel healthier by not drinking alcohol. Having a healthier body can mean more energy to enjoy life!

1 **2** **3** **4** **5**
Not effective **Neutral** **Very effective**

What are some other messages you think would be effective? Please let us know below: