**Distribution Agreement**

In presenting this thesis or dissertation as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature:

_____ _____

Tiffany Hailstorks Date

The Impact of Social Cognitive Determinants on First Trimester Abortion Pain

By

Tiffany Hailstorks
Master of Public Health

Behavioral Sciences and Health Education

_____
Dr. Jessica Sales
Committee Chair

_____
Dr. Carrie Cwiak
Committee Member

_____
Dr. Lisa Haddad
Committee Member

# The Impact of Social Cognitive Determinants on First Trimester Abortion Pain

By

Tiffany Hailstorks

M.D., Meharry Medical College, 2011
B.S., Hampton University, 2007

Thesis Committee Chair: Jessica Sales, PhD
Chair: Carrie Cwiak, MD, MPH
Chair: Lisa Haddad, MD, MS, MPH

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Behavioral Sciences and Health Education
2017

# Abstract

The Impact of Social Cognitive Determinants on Frist Trimester Abortion Pain
By Tiffany Hailstorks

In the United States, nearly 4 in 10 of all unintended pregnancies end in abortion. Adequate pain control for women undergoing abortion is critical as most women experience pain with the procedure. Pain perception is complex and composed of a multitude of elements. Identifying the psychosocial elements that contribute to pain perception will help strategize interventions to improve pain outcomes. The Social Cognitive Theory is utilized to determine if poor coping, decreased self-efficacy, limited social support and decreased collective efficacy will result in increased pain during surgical abortion. A cross-sectional survey was administered to women presenting to an abortion clinic for a first trimester abortion procedure. Participants completed questionnaires, visual analog scales and Likert scales for pain. Logistic regression models were used to analyze data. The results showed that a history of medical abortion was associated with lower pain scores, and white race was associated with higher pain scores. Although not significant, confidence in the staff tended to be associated with increased pain. Coping, self-efficacy, and social support had no bearing on the maximal pain a woman experienced during surgical abortion. Investigating the impact of social cognitive factors on abortion related pain will assist in improving strategies to identify women at increased pain risk. These interventions may potentially improve the pain experience for the many women undergoing surgical abortion each year.

**Length**: The Abstract may not exceed one page, formatted according to the regular page formatting instructions (margins, spacing, font). The text itself cannot exceed 350 words (not counting the title etc.) The Abstract may be single-spaced.

# The Impact of Social Cognitive Determinants on First Trimester Abortion Pain

By

Tiffany Hailstorks

M.D, Meharry Medical College, 2011
B.S., Hampton University, 2007

Thesis Committee Chair: Jessica Sales, PhD

A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Behavioral Sciences and Health Education
2017

# Table of Contents

# Introduction

## Abortion

Access to comprehensive reproductive health care is a fundamental right to all women. The ability to access family planning including abortion care without restriction is vital in upholding this right. Approximately one half (45%) of all pregnancies in the United States (US) are unintended, with nearly 4 in 10 ending in pregnancy termination by abortion[1]. In 2011, there were an estimated one million abortions performed in the US annually. The current abortion rate among reproductive aged women is 14.6 abortions per 1,000 women age 15-44 years. This 2014 data represents a 14% decline since 2011 [2], and is the lowest rate observed in US history since the legalization of abortion in 1973 [3].

Despite the declining trend in abortion incidence, nearly 1 in 3 women will have an abortion in her lifetime [4]. In 2014, more than half of all women receiving an abortion were in their 20s, with 34% of women being aged 20-24, and 27% of women being aged 25-29. The racial and ethnic identity of women who undergo an abortion varies, and not one race dominates the majority. Of abortion patients, 39% identify as white, 28% black, 25% Hispanic, 6% Asian or Pacific Islander, and 3% identified as other. Adolescent women account for 12% of abortions, with older teens (18-19 years) having a higher incidence than younger teens. Nearly 46% of all abortion patients have never been married [5]. Almost half of all abortion patients report having had at least one prior birth. The reasoning behind the decision to terminate a pregnancy typically relates to a woman's family life and ability to parent at that particular time. Over 75% of

women will site one of the following as a reason for terminating a pregnancy: concern for or responsibility to other individuals, inability to financially afford or care for a child, and interference with work, school or the ability to care for dependents [5]. In 2014, three-fourths of abortion patients were low income, with 49% living at less than the federal poverty line. Compared to 2008, women seeking abortion in 2014 were less likely to be uninsured. The increase in coverage is likely attributed to the expansion of healthcare services with the Affordable Care Act. This data along with other information compiled from population surveys is the best attempt to capture reproductive health and abortion statistics in order to accurately provide and expand on existing demographic numbers and abortion prevalence among US woman [5].

Induced abortions are amongst the most common surgical outpatient procedures. The majority of surgical abortions occur in the first trimester. Roughly 89% of abortions will occur in the first trimester, with 66% occurring prior to 8 weeks gestation [6]. Pain with minor surgical procedures continues to challenge the field of gynecology. Abortion related pain may affect a woman both physically and psychologically [7]. Current pain management for surgical abortion may include: local anesthetic, oral analgesics, moderate sedation, deep sedation, general anesthesia or a combination of approaches. While several recent studies have evaluated supplemental medications or therapies to reduce abortion-related pain, such as non-steroidal anti-inflammatory drugs, narcotics, misoprostol, nitrous oxide, music or doula support, most have failed to note improved pain scores. Optimal pain management has yet to be established as many women continue to report moderate to severe pain during and after an abortion procedure [8].

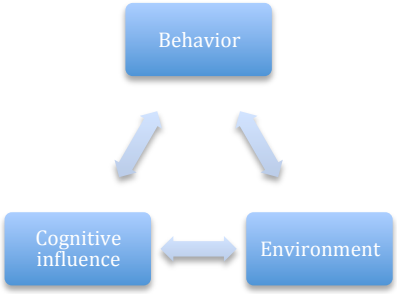
Pain control during abortion is a family planning research priority defined by the Society for Family Planning [9]. Adequate pain control during a surgical abortion for patients is a significant concern for both the patient and the provider [10]. The complexity of pain perception is the result of its intricate interplay between both physical and psychosocial features, both of which greatly vary among women presenting for abortion [11]. Women may experience pain throughout various time points of an abortion procedure. Pain during an abortion typically occurs during dilation of the cervix, uterine aspiration, and for a short time following the procedure [12]. Increased pain with an abortion has been associated with young age, nulliparity, less education, anxiety, depression, a retroverted uterus and dysmenorrhea [8, 13]. Decreased pain is associated with a prior history of vaginal delivery [13].

Aside from the physical elements that contribute to procedural pain, psychological and social factors play a central role in one's perception of pain during an abortion [14]. Non-pharmacological interventions, active participation in one's pain management, and control over one's life situation have been found to significantly impact one's perception of pain [13, 15]. Strategies that identify factors that contribute to the psychosocial elements of pain perception can be added to pharmacological interventions to benefit the large number of women who undergo surgical abortion procedures each year. These strategies in conjunction with current pain management modalities will further maximize pain control for women, and thus expand the public health impact of abortion care.

## Theoretical framework

The Social Cognitive Theory (SCT) is one of the most widely applied models of health behavior [16]. We chose this model to identify and evaluate factors that impact and potentially mediate the pain experienced during a first trimester surgical abortion. According to the SCT model, human behavior is explained through reciprocal determinism. This is defined by the interplay between behavior, personal cognitive factors and socio-environmental influences [16]. The constructs that comprise the SCT model allow for the comprehensive evaluation of the various influences that may impact a woman's pain experience during first trimester abortion.

Figure.1: Theoretical Framework: Social Cognitive Theory.




This model, as seen in figure 1, allows for the evaluation of cognitive, environmental and behavioral factors as they relate a woman's pain experience during a surgical abortion. The model has been applied to various aspects of abortion in prior research, but not specifically to pain management during abortion. The following constructs of interest were identified and are demonstrated in Table 1.

Table 1. Constructs of SCT to evaluate predictive factors that may influence abortion related pain.

| Cognitive influences on behavior | |
|---|---|
| Self-Efficacy | Confidence in one's ability to perform a behavior. |
| Collective efficacy | Belief in the collective effort and ability of a group to achieve an outcome. |
| **Environmental influences on behavior** | |
| Social support | Perception of encouragement and support from one's social network. |
| **Supporting behavioral factors** | |
| Behavioral skills | Abilities needed to successfully perform a behavior. |

*Table adapted from Glanz et al. [16].

Personal cognitive factors include the individual's ability to self-regulate behavior and reflect on or analyze their experience. Socio-environmental factors are the perceived or physical elements of the environment that affect one's engagement with participating with the behavior. Behavioral factors involve existing health behavior capabilities or skills. A health behavior includes observable, explicit actions as well as mental events and feeling states that can be reported and measured [17, 18]. The behavior of interest in this study was a woman's pain experience during an abortion. The pain experience was measured using a visual analog scale at designated time points during the abortion procedure. The intensity of pain was rated on a 100mm visual analog scale, which has been shown to be useful for the evaluation of pain in prior abortion research [19, 20]. We aimed to determine the impact of social cognitive factors on maximal pain scores during first trimester surgical abortion.

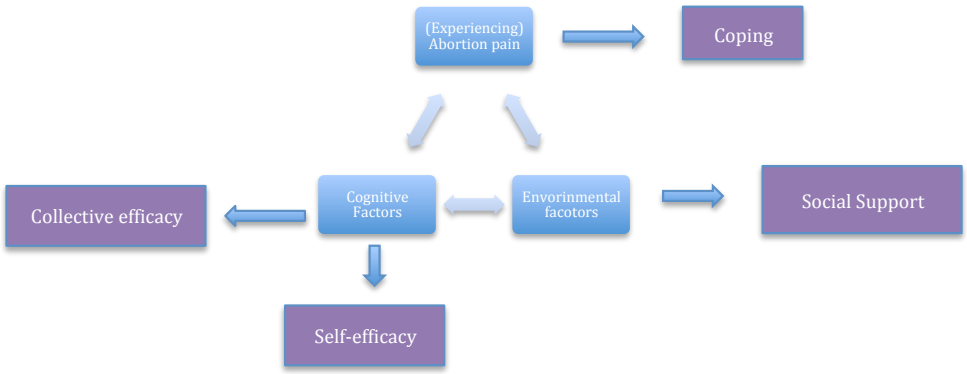
## Hypothesis

Using the social cognitive theory, we hypothesize that poor coping (behavioral skill) and decreased self-efficacy (cognitive influence) will negatively impact the maximal pain experienced during surgical abortion. In addition, limited social support and diminished

confidence in clinical staff (collective efficacy) will further impact pain. We believe that a decrease in these social cognitive constructs will result in increased pain during a surgical abortion. The interaction of these constructs and their potential role in predicting abortion related-pain were evaluated in our study.

*Hypothesis: Poor coping, decreased self-efficacy, limited social support, and decreased collective efficacy will result in increased pain during a first trimester surgical abortion under local anesthesia.*

Figure. 2: Schematic of social cognitive theory to evaluate the predicted hypothesis.




The schematic above (Figure 2) portrays the 3 social cognitive factors (in blue), and the major constructs (in purple) that comprise each influence to determine the overall impact on a woman's pain experience during first trimester surgical abortion.

## Literature Review

Pain is a complex phenomenon. Due to the multifaceted nature of pain, it is imperative to evaluate potentiating factors that may result from personal cognitive influences as well as

other social and environmental factors that may contribute to the pain experienced during an abortion.

## Factors that Influence Coping after Abortion

One of the earliest studies to examine cognitive predictors of coping with an abortion was conducted to assess the role of causal attributions, expectations for coping, and the ability to find meaning, in order to predict coping and depression after the termination of an unwanted pregnancy in first trimester [21]. The attributions of interest included self-character and self-blame. Women presenting to an abortion clinic were surveyed before and after their abortion. The analysis concluded that self-blame was the most prevalent attribute. On average, women found pregnancy to be somewhat meaningful, and most coped very well following the abortion, and even better three weeks out from the procedure. Women who blamed their unintended pregnancy on their character were found to cope significantly worse. Women with low coping expectations pre-procedure also had a more modest mood post procedure. Although women who regarded the pregnancy as highly meaningful coped less immediately following the procedure, there was no impact on coping three weeks post procedure and they seemed to fair well as time progressed from the event. This study also evaluated social support and found that women accompanied by their partners had more difficulty coping immediately after the procedure. While this study did not ask participants about pain, it inquired about physical complaints. These physical complaints included: abdominal cramps, nausea, dizziness, pains in lower back, pains in leg, and headache. They were rated on a 7-point scale from "not at all" to "totally". Women with low coping expectations reported more physical complaints than women with high coping expectations [21].

Further investigation of factors that predict how one copes with a stressful life event were studied. In 1998, Major et al. conducted a study to evaluate factors that predict how women cope with and adapt with unintended pregnancy resolved by abortion [22]. The primary goal of the study was to test an integrative model of adjustment to abortion derived from a general theory of adaption to stressful life events. Major et al. hypothesized that the effects of personality (self-esteem, control and optimism) on post-abortion adaptation (distress, well-being and decision satisfaction) would be mediated by pre-abortion cognitive appraisals (stress appraisals and self-efficacy) and post-abortion coping. This was a prospective longitudinal study of 527 women who presented to an abortion clinic reporting an unintended pregnancy. The participants completed a pre-abortion questionnaire as well as a follow up questionnaire post-procedure. The pre-abortion questionnaire assessed personality resources including self-esteem, perceived control and optimism. Self-efficacy for coping with abortion was assessed based on Bandura's model of self-efficacy. Results indicated that the women in the study tended to report fairly high levels of optimism, self-esteem, and perceived control. The women viewed the abortion as a moderately stressful event, and most women appraised themselves as having sufficient resources to cope with the abortion. Most women also reported fairly high levels of perceived self-efficacy. Self-efficacy did not significantly predict women's coping through support seeking. However, the more resilient personality traits that a woman had in her repertoire, the less likely they were to view the abortion as a stressful situation, and the higher their self-efficacy was for coping with abortion. Post-abortion findings demonstrated that coping with abortion-related emotions through seeking social support was associated with lower levels of psychological stress.

At this time, this study represented the most comprehensive examination of the impact of psychosocial constructs on adjustment following an abortion [22]. Again, pain was not evaluated here.

In order to investigate other models to identify relations between behavior and function as it related to coping with abortion, Cozzarelli et al. used the mental models of attachment to evaluate coping with abortion and adjustment post-abortion. In 1998 they hypothesized that mental models would influence post-abortion adjustment by affecting self-efficacy for coping with abortion, and perceived social support and social conflict from a male partner when undergoing an abortion. It was predicted that women with positive models of self were expected to be higher in self-efficacy for coping, and that women with positive models of self and others expected to perceive higher levels of social support and lower levels of social conflict. Participants presenting for first trimester abortion were given a survey to complete pre-abortion, and a follow-up questionnaire approximately one month following the procedure. The results concluded that a positive model of self had higher levels of self-efficacy for coping. The results of the analysis demonstrated that mental models of attachment had an impact on the many facets involved in the process of coping [23].

The interplay of personality traits and self-efficacy as predictors of coping were evaluated in a study conducted at a private abortion clinic among women seeking a first trimester abortion. Pre-abortion and post abortion surveys were administered to participants. The results concluded that perceived self-efficacy for coping was significantly related to high self-esteem, optimism, and greater self-control, as well as low levels of depression at the initial evaluation. Self-efficacy was a strong mediator of

psychological adjustment post procedure both immediately and 3 weeks post-procedure. In addition, pre-abortion depression was also determined to have effects on adjustment post procedure [24].

In 2003, Faure et al. devised a study to examine the relationship between self-efficacy, depression, and anxiety. This study was grounded in theory from Bandura's self-efficacy and prior studies related to abortion coping [25]. The goal was to further evaluate the relationship between self-efficacy, depression, anxiety and short term adjustment following an abortion. They implemented a pre-abortion and post-abortion (3 weeks) survey to patients presenting for a first trimester abortion procedure. The sample size consisted of 86 women who obtained first trimester abortion at less than 12 weeks gestation. However, of the original sample only 43 completed pre- and post-measurements. The Beckman Depression Inventory and State Trait Anxiety Inventory were utilized to assess both depression and anxiety respectively. The analysis concluded that high levels of self-efficacy related to low levels of depression and anxiety. Highly perceived self-efficacy strongly related to better adjustment. Both depression and anxiety decreased after the termination procedure. Adjustment following the procedure was noted to be improved with higher self-efficacy, low depression, low anxiety, higher education and earlier gestational age [25].

In 2012, a study evaluated a women's anticipation with coping post-abortion. This study by Foster et al, recognized that post-abortion coping is affected by complex factors related to an individual's characteristics and experiences, as well as social, cultural, and environmental factors [26]. The study explored self-reported anticipated emotional responses to abortion at the time a woman was seeking an abortion in order to

evaluate factors that may predispose her to anticipate poor coping. The assessment survey was completed prior to counseling, nurse evaluation and the abortion procedure. The participant completed checklists of emotions and a survey regarding coping post-abortion. The most common emotion experienced was relief (63%), and only 3.4% of women anticipated coping poorly post-procedure. Predictors of poor coping included: low confidence in their decision, history of depression, spiritual concerns, young age (teens), and a diagnosis of fetal anomaly. Anticipation of self-efficacy as well as factors regarding their abortion decision impacted one's ability to cope with abortion [26].

## Psychosocial Factors that Influence Pain

In 1974 Bracken et al. set out to evaluate the potential reactions experienced by women following an inducted abortion. It was predicted that partner's knowledge about the abortion, and his support will be associated with a more positive reaction to the abortion immediately following the procedure. Similarly, parental knowledge and support would correlate with a more favorable reaction to the abortion procedure. All participants were given a survey one-hour post-abortion procedure. The survey instrument consisted of nine psychological, social, and intra-psychic items. The results indicated that abortion was significantly more favorable when the perceived partner and anticipated parental support was greatest. These results were more evident among older women for partner support and younger women for parental support. This study was one of the first to evaluate pain at time of the procedure. One item out of nine evaluated the degree of pain experienced during the procedure. This item was not examined in terms of its relationship with other variables due to premedication (Demerol and Valium) variability:

medications were given at the discretion of the provider for patients whom it was anticipated that the procedure would be particularly painful [27].

Theoretical formulations of pain propose a complex interaction between physiological and psychological processes that impact pain perception [13]. Belanger and colleagues postulated that pain sensations are affected by coping, mood, individual beliefs, past experience, ongoing stimuli, and support systems. The goal of their study was to examine the incidence, intensity, and nature of pain involved in first trimester abortion, and investigate the relationship between pain levels and variables including demographic, emotional, psychological and medical features. The study consisted of a sample size of 109 women who presented for a first trimester abortion at a community health clinic in Montreal, Canada. Participants completed a pre-abortion assessment evaluating depression, anxiety, questions on the complexity of the abortion decision, ambivalence, expectancy of pain, tolerance of pain, and social support. Difficulty of the decision process, expectations, and partner's support were measured on a VAS scale. Participants were asked to choose words that best describe the sensations and feeling that they experienced during the procedure. Visual analog scales were used during the procedure as well as 15 and 30 minutes post-procedure for evaluation. Pain questionnaires, verbal and visual analog scales were given to participants shortly after the procedure. Post-abortion assessments were also completed 2-4 weeks post procedure. The results indicated that patients experienced more pain than they anticipated. Pre-abortion depression was a predictor of pain intensity. The results failed to show that the presence of a male partner improved the woman's pain response during the procedure. It also concluded that patients with more ambivalence towards the abortion, those with no

support, and those of younger age (13-17) reported higher depression and anxiety at the 2-4 week follow-up [13].

One of the most recent evaluations of predictors and perceptions of pain in women undergoing first trimester surgical abortion was conducted in a study evaluating pain and pain predictors in women undergoing first trimester abortion with manual vs. electric aspiration. The aim of the study was to determine if perceptions differ among patients, advocates (participant support person) and physicians when comparing the different methods of uterine aspiration [12]. All participants received local anesthesia and the gestational age limit was 11 weeks for eligibility to participate in the study. Participants completed baseline questionnaires, visual analog scales (VAS) and Likert scales on pain. Participants' pain scores on the VAS for the pain experienced during the procedure was obtained immediately after dilation and aspiration. Pain scores were also evaluated 30 minutes post-procedure and at the 2-4 week follow up. There were 144 women randomized in the study, of which only 69 completed follow up pain scores at the 2-4 week follow up. Factors that were predictive of pain experienced during the procedure included the expectation of more pain during the procedure, and the expectation of moderate to severe bleeding during the procedure. Women who had fear of pelvic exams were more likely to report moderate to high pain. The results concluded that those who expected more pain, anticipated increased bleeding, and those who were non-white women reported higher procedural pain. Prior history of abortion, comfort with decision, and partner involvement did not impact pain scores. The multivariable analysis failed to show a single factor that was predictive of procedure-related abortion pain.

The factors evaluated in prior research related to abortion coping assisted in our methodology as well as identified our variables of interest to determine elements of the SCT that may predict a women's pain experience during a first trimester surgical abortion. The early psychology research was grounded in theory and weighed heavily on Bandura's model of self-efficacy as well as other constructs of the social cognitive theory. Those studies focused on the impact of cognitive factors on abortion coping and adjustment following the procedure. The abortion pain studies evaluated potential predictors of pain. Not all predictors were social, cognitive or environmental factors. Aside from the study by Singh et al, the earlier studies were not directed to evaluate the impact of such factors on maximal pain. There is a dearth of research regarding cognitive and socio-environmental constructs affecting pain at the time of abortion. This study will help narrow that gap and potentially provide information for whether or not these predicted constructs have any bearing on abortion related pain. Results could potentially assist in targeting strategies geared towards pain management. This may have a significant impact on the many US women who undergo abortion each year.

# Materials and Methods

## Participants and procedure

This study was a cross-sectional survey of women presenting for first trimester surgical abortion at a freestanding abortion clinic in Atlanta, Georgia. The survey was administered to patients who consented to participate in a randomized double-blind placebo-controlled trial evaluating the impact of gabapentin given preoperatively on perioperative pain scores for women receiving a first trimester surgical abortion. The

abortion clinic offers abortion services to women up to 21 weeks 6 days gestation, the legal gestational age limit in the state. The clinic operates Tuesday through Saturday and provides care to women from throughout the southeastern region as well as other regions of the United States. Recruitment for the study began December 2016. The study is currently ongoing. A member of the study team approached all women presenting for an abortion who selected local anesthesia for their procedure. No patients were approached prior to financial payment for the procedure. This assured that no incentive for participation in the randomized controlled trial was provided before consent to surgical abortion. A standard recruitment script was employed, and patients expressing interest were screened for eligibility. For those women who were ineligible or declined participation, documentation was noted to identify the reason. Women were eligible if they were: 18 years or older, presented for surgical abortion under local anesthesia, fluent in English, and had a driver to take them home (cab or Uber were acceptable). Exclusion criteria included: allergy, sensitivity or contraindication to Gabapentin, severe renal disease, current use of Gabapentin or Pregabalin, breastfeeding, or contraindication to outpatient surgical abortion. All eligible women who agreed to participate were provided written informed consent with a member of the study team. Following informed consent, patients were enrolled into the study.

Next, participants were evaluated by the clinical nurse to ensure that they could safely proceed with the surgical abortion procedure. This evaluation included a comprehensive review of the participant's medical history. Once confirmed to proceed with the surgical abortion, the research assistant obtained the next sequentially numbered pill container. The clinical nurse or co-investigator then administered the intervention

(Gabapentin vs. Placebo) to the participant with sips of water. Gabapentin 600mg was selected as a well-tolerated intermediate dosage with benefit proven in prior preoperative studies. Randomization was done using computer generated random numbers using varying block sizes of 4 and 6. Gabapentin and placebo were packaged in identical gelatin capsules and were sealed by an independent pharmacy. All participants waited 1-2 hours after the administration of the medication before proceeding with the surgical procedure [28].

During the time between administration of the intervention and the surgical abortion, a member of the study team administered the survey on a research-designated tablet. The participants then completed the survey in a private room in the clinic (exam room or research room). There was no concern that the study intervention would interfere with the survey administration as the medication has a peak plasma concentration 1-2 hours after administration. A member of the study team was readily available to answer any questions as needed. As of 7/17/17, 56 participants had completed the survey.

Pain was assessed at various time points using the REDCap database on a research-designated tablet. Our primary outcome for the RCT was pain score at time of uterine aspiration as measured on a 100mm visual analog scale (VAS). Participants were asked to mark the VAS to indicate their level of pain during aspiration. Secondary outcomes included pain on the 100-mm VAS preoperatively immediately prior to the procedure, at time of paracervical block (PCB), dilation of the cervix, completion of the procedure (removal of the speculum), 10 minutes and 30 minutes following the procedure, and at discharge (if different from the 30 minute time point). For the purpose

of our cross-sectional study, the 30-minute pain score reported by participants post procedure defines maximal pain. Nausea and vomiting were assessed pre-operatively, and during the post-operative intervals at 10 and 30 minutes. Anxiety prior to the procedure was measured using the preoperative state trait anxiety inventory. Side effects were assessed using a checklist prior to discharge.

A member of the study team contacted the participants on postoperative day number one to complete the follow up assessment. An email or text message was sent to the participant and a link to the survey was provided. The post-operative day 1 survey assessed pain, nausea, vomiting, side effects, general satisfaction with the procedure (on a 5-point scale), as well as a quality of recovery survey questionnaire. Outcome measures were collected on a tablet using a web-based password-protected relational database (REDCap). All VAS scale scoring and questionnaires were completed using this database on a research-designated tablet.

## Baseline Measures

The following measures were obtained using a pre-procedure questionnaire. This questionnaire was completed during the 1-2 hour wait between receipt of the intervention and the surgical procedure. The questionnaire explored demographic, social, psychological, medical, and cognitive factors; all constructs included were theoretically or empirically supported. Demographics included age, gravity, parity, and gestational age as continuous variables. Relationship status, race, ethnicity, income, education, and insurance type were categorical variables.

**General Self-efficacy**

This is a 10-item continuous scale that was a self-report measure of self-efficacy, with an internal validity of 0.76 to 0.9 [29]. The general self-efficacy scale is correlated with emotion, optimism and satisfaction. The items were measured with a 4-item scale from 1 (not at all true) to 4 (exactly true). The total scores ranged between 10-40 with higher scores indicating that the participant had greater self-efficacy. Adding up all responses to a sum score completed scoring for this scale.

**Coping**

Coping was assessed using a shortened version of the Coping Inventory for Stressful Situations. This is a 21-question continuous scale (CISS-21) [30]. This scale is measured for adults and is designed to examine a designated social situation. The answers were measured using a 5-point scale ranging from 1 (not at all) to 5 (very much). On this 21-question scale, seven items are used for each coping style - avoidance, emotion, and task oriented coping styles. The responses of the 7 items of each subscale were summed together to obtain aggregate scores for the three coping strategies. All three subscales have Cronbach's alpha values of greater than 0.7 [31]. This validated scale has good reliability and validity.

**Social support**

The MOS (Medical Outcomes Study) Social Support Survey is a 19-item continuous scale that covers four dimensions of support including: emotional/informational, tangible, affectionate, and positive social support [32]. The reliability is 0.96 for emotional/informational, 0.92 for tangible, 0.91 for affection, 0.94 for positive interaction, and 0.97 overall [32, 33]. The instrument uses a Likert scale with each item

response ranging from 1 (none of the time) to 5 (all of the time). The responses of each subscale were summed together to obtain aggregate scores for each dimension of support. The scoring was be done by computing the average for each subscale or all 19 items in the scale. Higher scores are indicative of a greater level of social support.

**Past tobacco, alcohol and drug use**

Items assessing current and past drug use were evaluated. These questions ranged from ever used in life, to use in the past 6 months as well as current use. The answer choices were categorical with yes/no responses. The frequency of use was determined by daily, weekly, or monthly use. Drugs included tobacco use (smoking), alcohol, marijuana, cocaine (crack), heroin, methamphetamines, or any other illicit drug use not mentioned (examples given: hallucinogens, club drugs, prescription drugs or any other drug or substance used to get high).

**Medication use**

Items assessing current or past medication use were evaluated. These questions ranged from current use to use within the past 6 months. The answer choices were categorical with yes/no responses. The frequency of use was determined by daily, weekly, or monthly use. Medication use included non-steroidal anti-inflammatory drugs (NSAIDs), opiates, other prescription medications, or over the counter medications. Participants were allowed to list medications in a free text area.

**Psychiatric history**

These questions focused on psychiatric history, or history of sexual or physical abuse. The presence of a lifetime DSM-V (Diagnostic and Statistical Manual of Mental

Disorders, Fifth edition) disorders was assessed. Questions to identify psychiatric history included a clinical diagnosis of anxiety, depression, or other psychiatric conditions diagnosed by a physician, nurse practitioner or counselor. Examples for these conditions included bipolar disorder, schizophrenia, and PTSD. Answer choices were categorical with yes/no responses. The participant could document their disorder in a free text space if the disorder was not specifically mentioned prior. We asked questions regarding medication use for the disorder and the name of the medication for current use. The State-Trait Anxiety Inventory was used to measure the patient's anxiety level pre-abortion procedure. As in previous studies, standardized measures of anxiety and depression were used to evaluate the predictive ability in the severity of pain during the abortion procedure [13]. One item inquired about a history of sexual or physical abuse.

**Prior surgical or abortion pain experience**

Questions pertained to anticipation of pain with the procedure, anxiety around the abortion procedure, and any prior same day outpatient surgical procedure in the past. There are specific items assessing prior abortion experience with medical abortion, surgical abortion, or surgical abortion with local anesthesia. These questions were categorical with yes/no responses. There was one question regarding anticipated pain with the procedure measured with a 4-point scale from 1 (no pain) to 4 (severe pain). One question asked, "if you had a prior surgical procedure, did you experience pain…?". This item was also measured using a 4-point scale from 1 (no pain) to 4 (severe pain). One item measured whether the expectation of pain affected a patient's anticipated anxiety around the surgical procedure. This item is measured with a 4-point scale from 1 (I can tolerate pain) to 4 (pain makes me severely anxious). One item measured coping

with pain on a 3-point scale from 1 (I cope well), to 2 (I can cope), and 3 (I do not cope well).

**Access to the abortion clinic**

Six items to assessed a woman's decision-making process when deciding on an abortion clinic. One item assessed any financial difficulty affecting their abortion decision that day. Two questions determined any difficulty with transportation to the clinic, or difficulty with finding an abortion clinic or provider. All 3 of these items were measured with a 4-point scale from 1 (not at all a problem) to a 4 (serious problem). There are 3 items that measured confidence in the clinic's, staff's or physician's ability to meet the patient's intended goal for the day. The goal of these questions was to gauge how confident the woman was in her decision of choosing an abortion clinic and the clinic's ability to meet her anticipated needs for the encounter. These items used a 3-point scale from 1 (not confident) to 3 (very confident).

**Abortion decision difficulty, burden, and priority**

These 6 items were adopted from Ditzhuijzen et al [34]. These items were used to assess pre-abortion doubt ("To what extent did you have doubts regarding the abortion?" and abortion experience pressure ("To what extent did you experience pressure from others to have an abortion?"). These were measured using a 5-point scale that ranged from 1 (not at all) to 5 (very large extent). One item was used to evaluate the extent to which the participant stood by their abortion decision ("To what extent do you stand by your abortion decision?"), and was measured with a 5-point scale ranging from 1 (I do not stand by it) to 5 (I completely stand by it). Two questions were asked to determine the extent that the unintended pregnancy and abortion were emotionally burdensome. A 5-

point scale was also employed with answer choices of 1 (extremely burdensome) to 5 (not at all burdensome). One item assessed the priority in terminating the pregnancy. Participants are asked, "How much of a priority has it been to end the pregnancy?", and the response is measured using a 5-point scale ranging from 1 (not a priority) to 5 (essential).

### Statistical analysis

For the statistical analysis, covariate measures were evaluated using descriptive statistics and frequencies. The continuous scales (self-efficacy, coping, social support) were evaluated to determine their distribution. The distribution of maximal pain, as well as pain scores at other times points, was evaluated. For continuous variables, non-linear associations were explored through the evaluation of each variable as categorical with breaks at the median, which is commonly used in the literature. If no clear non-linear association was present, then variables were maintained as continuous in the model. The Mann-Whitney U test statistic for nonparametric measures was used to assess the medians of predictive factors vs. pain outcomes dichotomized at the median. Chi-squared analysis was used to measure associations between categorical variables and pain scores dichotomized at the medians for the designated pain outcome time points. Categorical predictive variables that had too few expected counts in the crosstab associations were collapsed into 2 groups and then compared to the dichotomized pain scores in order to examine associations. Factors associated with an outcome at the $p < .20$ were included in the logistic regression model for the corresponding outcome variables. This p-value was utilized due to the small sample size for the study. The aim was to include as many predictive factors in the model as possible despite our limited power. A

backward stepwise regression model was used for analysis. For entry into the logistic model, p=0.05 with removal at p=0.10. The classification cut off was 0.5 with maximum iteration of 20. Overall, p< .05 was the level determined for statistical significant. All statistical analysis was performed using SPSS.

# Results

## Baseline characteristics

A total of 56 women were enrolled as of 7/17/17. For the analysis, only 50 women were included due to 6 of them not completing all of the evaluated time points for comparison. Baseline characteristics are shown in Table 2. The age of study participants ranges 18 to 34 years, with a mean age of 25 (M=25.18, SD=4.02). The average gestational age was 9 weeks gestation (M=8.92, SD=1.97), with a range of 5.6 weeks to 13.3 weeks. The participants come from a diverse set of racial backgrounds including Native American, Black/African American, White/Caucasian, and Mixed or multi-racial. The majority of women (94.0%, N=47) did not identify as Hispanic/Latina. English was the first language for 96.0% (N=48) of participants. Over 75% of the participants were single/divorced/widowed (N=43, 86.0%). All of the participants reported having some high school education or higher. The annual income for this population varied, with over 50% of the study population having an annual income of $25,000 or less. Insurance coverage was distributed among Medicare/Medicaid (26%), private insurance (38%), uninsured (28%) and other (6%). Other types of insurance coverage listed by patients included Tricare and Kaiser.

**Table 2. Baseline Characteristics (N=50, %)**

| | |
|---|---|
| Age (years) | 25.2 ± 4.0 |
| BMI (kg/m$^2$) | 29.5 ± 7.0 |
| Gestational age (weeks) | 8.9 ± 2.0 |
| Race | |
| American Indian/Native Alaskan | 1 (2.0) |
| Asian | 0 |
| Black/African America | 28 (56.0) |
| White/Caucasian | 16 (32.0) |
| Mixed or multi-racial | 2 (4.0) |
| Other | 3 (6.0) |
| Native Hawaiian/Pacific Islander | 0 |
| Don't know/Refused/Not specified | 0 |
| Ethnicity | |
| Hispanic | 3 (6.0) |
| Non-Hispanic | 47 (94.0) |
| Marital status | |
| Single/Divorced/Widowed | 43 (86.0) |
| Cohabitating | 1 (2.0) |
| Married | 6 (12.0) |
| Education | |
| Less than high school | 0 |
| Some high school | 3 (6.0) |
| High school diploma or GED | 13 (26.0) |
| Some college | 17 (34.0) |
| Associate Degree or Technical certificate | 7 (14.0) |
| Bachelors Degree | 9 (18.0) |
| Masters Degree or higher | 1 (2.0) |
| Income | |
| <= $10,000 | 15 (30.0) |
| $10,000 - $25,000 | 13 (26.0) |
| $25,001 - $50,000 | 16 (32.0) |
| $50,001 - $75,000 | 2 (4.0) |
| $75,001 - $100,000 | 0 |
| > = $100,001 | 1 (2.0) |
| Don't know/refused | 3 (6.0) |
| Insurance (N=49) | |
| Medicare/Medicaid | 13 (26.0) |
| Private | 19 (38.0) |
| Other | 3 (6.0) |
| None | 14 (28.0) |

## Medical history and drug use

We assessed a prior history of anxiety and depression that was clinically diagnosed by a health care provider. Twenty-two percent of women reported a history of anxiety. This percentage accounted for 11 participants, of which 3 reported taking medication for the anxiety (Celexa, Gabapentin, Xanax). Eighteen percent of women reported a history of

depression. This accounts for 9 participants, of which 1 reported taking medication for the depression (Celexa). Table 3 displays this information as well as other drug use (over the counter, illicit and prescription drug use). Of the women surveyed, 10% (N=5) reported a history of sexual assault, 2% (N=1) physical assault, and 4% (N=2) reported a history of both.

**Table 3. Medical History and Drug use (N=50, %)**

| | |
|---|---|
| **Medical History** | |
| Anxiety | 11 (22.0) |
| Depression | 9 (18.0) |
| | |
| **Drug Use** | |
| NSAIDs | 47 (94.0) |
| Use within 6 months | 32 (64.0) |
| Frequency of use | |
| Daily | 0 |
| Weekly | 8 (16.0) |
| Monthly | 24 (48.0) |
| | |
| Opioid | 17 (34.0) |
| Use within 6 months | 3 (6.0) |
| Frequency of use | |
| Daily | 0 |
| Weekly | 1 (2.0) |
| Monthly | 2 (4.0) |
| | |
| Tobacco | 17 (34.0) |
| Use within 6 months | 9 (18.0) |
| Frequency of use | |
| Daily | 6 (12.0) |
| Weekly | 2 (4.0) |
| Monthly | 1 (2.0) |
| | |
| Alcohol | |
| Use within 6 months | 45 (90.0) |
| Frequency of use | 34 (68.0) |
| Daily | 0 |
| Weekly | 9 (18.0) |
| Monthly | 25 (50.0) |
| | |
| Marijuana | 23 (46.0) |
| Use within 6 months | 8 (16.0) |
| Frequency of use | |
| Daily | 4 (8.0) |
| Weekly | 1 (2.0) |
| Monthly | 3 (6.0) |
| | |
| Crack/Cocaine | 1 (2.0) |
| Use within 6 months | 1 (2.0) |
| Frequency of use | |
| Daily | 0 |
| Weekly | 1 (2.0) |
| Monthly | 0 |
| | |
| Heroin | 0 |
| | |
| Methamphetamines | 1 (2.0) |
| Use within 6 months | 0 |

| | |
|---|---|
| Other drugs (Xanax, Percocet) | 2 (4.0) |
| Use within 6 months | 1 (2.0) |
| Frequency of use | |
| Weekly | 1 (2.0) |

## Abortion History

Analysis of prior abortion history showed that 6 women had a prior medical abortion, 20 women had a prior surgical abortion, and 15 of those women had a prior surgical abortion with local anesthesia. Anticipated pain was measured on a 4-point scale, and 72% of women reported that they anticipated moderate (N=31, 62%) to severe (N=5, 10%) pain with the procedure on the day of the surgery. Of the participants, 22 of them reported having prior abortion related pain, with 19 women reporting minimal to severe procedural pain (no pain N=3 (6%), minimal pain N=8 (16%), moderate pain N=9 (18%), severe pain N=2 (4%)). The majority of women felt like they tolerate pain well (N=18, 36%) or that pain only made them somewhat anxious (N=24, 46%). The remaining women stated that the thought of pain resulting from the procedure made them moderately (N=5, 10%) or severely (N=4, 8%) anxious. A descriptive analysis of coping with pain, clinic confidence (collective efficacy), and abortion decision certainty is shown in Table 4.

**Table 4. Coping, Collective Efficacy, Abortion Decision**

| **Coping (N=50, %)** | | **N (%)** |
|---|---|---|
| How well do you cope with pain? | I cope well with pain | 18 (36) |
| | I can cope with pain | 23 (46) |
| | I do not cope well with pain | 9 (18) |
| **Collective efficacy – Clinic confidence (N=50, %)** | | |
| How confident are you in the abilities/capabilities of the *clinic* in meeting your goal today? (N=49) | Not confident | 1 (2) |
| | Somewhat confident | 14 (28) |
| | Very Confident | 34 (68) |
| How confident are you in the abilities/capabilities of the *staff* in meeting your goal today? | Not confident | 1 (2) |
| | Somewhat confident | 9 (18) |
| | Very Confident | 40 (80) |
| How confident are you in the abilities/capabilities of the *physician* in meeting your goal today? | Not confident | 1 (2) |
| | Somewhat confident | 8 (16) |
| | Very Confident | 41 (82) |

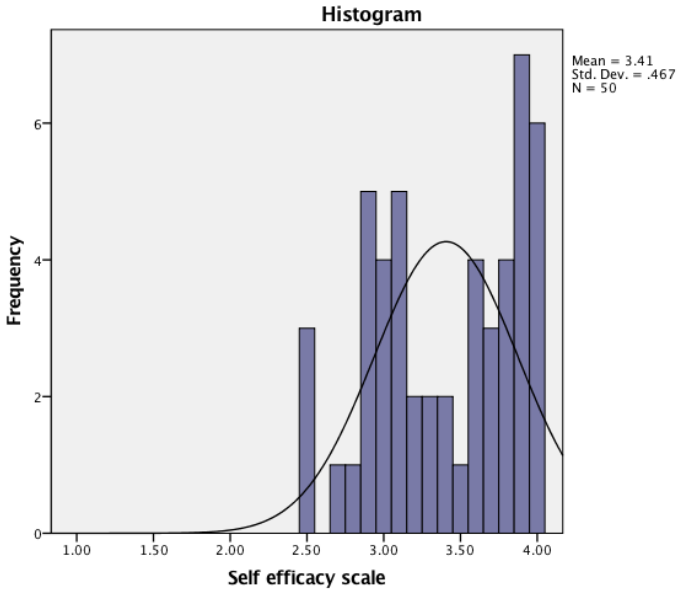
| Abortion Certainty (N=50, %) | | |
|---|---|---|
| To what extent did you have doubts regarding the abortion? | Not at all | 21 (42) |
| | Somewhat | 16 (32) |
| | Moderate | 5 (10) |
| | Large extent | 5 (10) |
| | Very large extent | 3 (6) |
| To what extent did you experience pressure from others (family, partner, etc.)? | Not at all | 37 (74) |
| | Somewhat | 7 (14) |
| | Moderate | 4 (8) |
| | Large extent | 2 (4) |
| | Very large extent | 0 |
| To what extent do you stand by your abortion decision? | I do not stand by it | 0 |
| | I somewhat stand by it | 3 (6) |
| | Neutral | 4 (8) |
| | I largely stand by it | 8 (16) |
| | I completely stand by it | 35 (70) |
| To what extent is the abortion emotionally burdensome? | Extremely burdensome | 5 (10) |
| | Burdensome | 10 (20) |
| | Neutral | 8 (16) |
| | Somewhat burdensome | 11 (22) |
| | Not at all burdensome | 16 (32) |
| To what extent is the unintended pregnancy emotionally burdensome? | Extremely burdensome | 11 (22) |
| | Burdensome | 10 (20) |
| | Neutral | 7 (14) |
| | Somewhat burdensome | 12 (24) |
| | Not at all burdensome | 10 (20) |
| How much of a priority has it been to end this pregnancy? | Not a priority | 1 (2) |
| | Low priority | 0 |
| | Medium priority | 8 (16) |
| | High priority | 26 (52) |
| | Essential | 15 (30) |

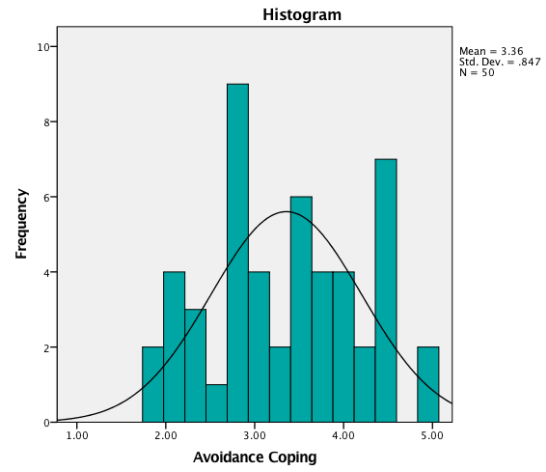
The variables assessed in table 4 and those pertaining to abortion history were analyzed using chi-squared test to determine association to maximal pain dichotomized at the median. Some of these variables were dichotomized into high and low groups, and then further analyzed with chi-squared to determine association to the pain outcome. These variables were ones that had less than 5 expected counts in the crosstab associations.

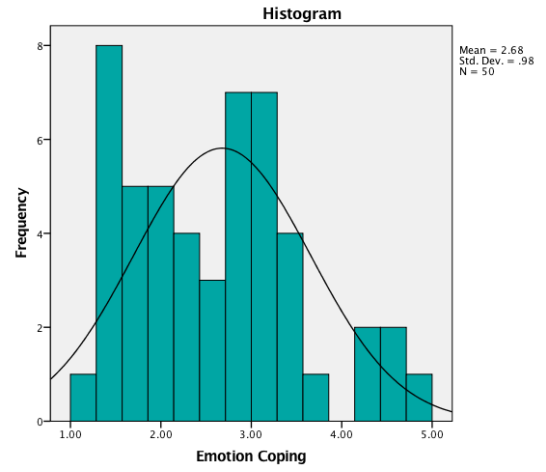
## Scales

The GSE (self-efficacy), CISS-21 (coping), MOS (social support) scales were used to assess cognitive predictors on abortion pain. The graphs below show the distribution curves for each scale among our study population.

Figure 3. Self-efficacy Histogram





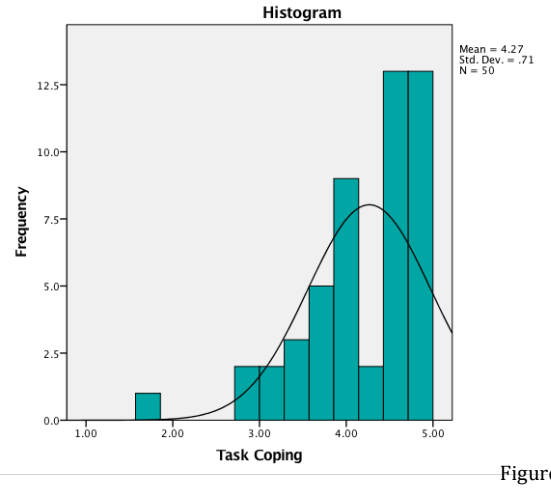
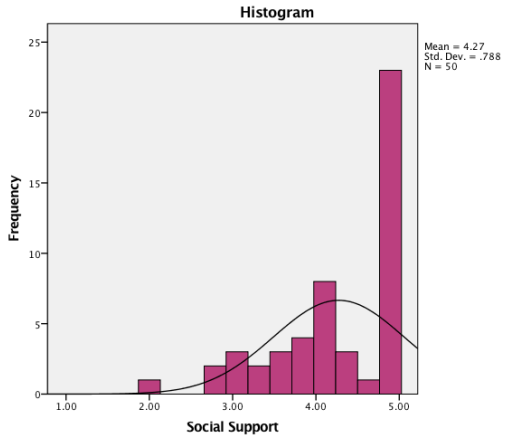




Figure 4. Coping Subscales Histogram

The coping scale is demonstrated in Figure 4. The coping scale has 3 subscales including: avoidance, emotion and task coping. The distribution for the social support scale is shown in Figure 5.

Figure 5. Social Support Histogram




As seen in Figures 3-5, most of the scales are non-normal. The avoidance coping scale has a more normal distribution. Although not pictured here, the social support subscales (emotion, tangible, positive, affectionate) were also non-normal.

## Evaluation of Pain

The median pain scores were evaluated at different time points during the abortion procedure. A graph displaying these values is seen in Figure 6. The median pain scores are as follows: expected pain = 59.5, pain while waiting = 3, pain at time of PCB = 70, pain with dilation = 70, pain with aspiration = 70, maximum pain = 66.5. As seen in Figure 6, there is a wide range outside of the median demonstrating the variation in pain at each time point.

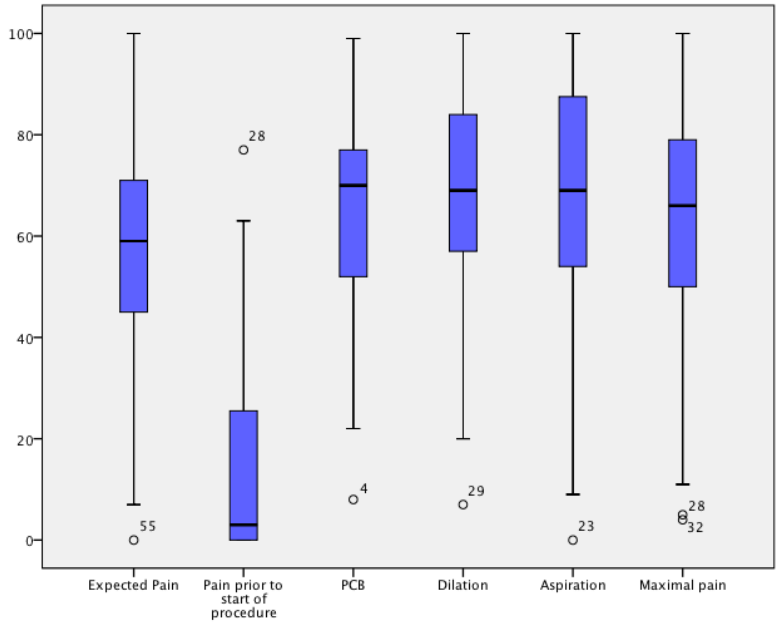



Figure 6.
Median pain scores

The maximal pain score was dichotomized at the median and the scales evaluating self-efficacy, coping, and social support were analyzed with the Mann-Whitney U statistic to determine correlation. The continuous variables for age and gestational age were also analyzed. None of the continuous variables or scales were statistically significant to the pain outcome. Values displayed in Table 5.

Table 5. Bivariate analysis of continuous variables and maximal pain dichotomized at the median.

| | Pain < median n=25 | IQR (25, 50, 75) | Pain > median n=25 | IQR (25, 50, 75) | *P* |
|---|---|---|---|---|---|
| Age | 25.00 | 23.0<br>25.0<br>27.0 | 25.0 | 22.0<br>25.0<br>28.0 | 0.953 |
| Gestational age | 9.30 | 7.05<br>9.3<br>11.4 | 8.40 | 7.25<br>8.4<br>10.1 | 0.620 |
| Self Efficacy | 3.4 | 3.05<br>3.4<br>3.85 | 3.50 | 3.00<br>3.50<br>3.90 | 0.930 |
| Avoidance Coping | 3.00 | 3.85<br>4.57<br>4.86 | 3.43 | 2.57<br>3.43<br>3.93 | 0.641 |
| Task Coping | 4.57 | 3.86<br>4.50<br>4.86 | 4.29 | 3.92<br>4.29<br>4.79 | 0.674 |
| Emotion Coping | 2.86 | 1.71<br>2.86<br>3.29 | 2.57 | 1.86<br>2.57<br>3.07 | 0.748 |
| Social Support Emotion | 4.75 | 3.93<br>4.75<br>5.00 | 4.37 | 3.00<br>4.38<br>5.00 | 0.306 |
| Social Support Tangible | 4.00 | 4.00<br>4.00<br>5.00 | 4.00 | 3.63<br>4.00<br>5.00 | 0.580 |
| Social Support Positive | 5.00 | 4.00<br>5.00<br>5.00 | 5.00 | 4.00<br>5.00<br>5.00 | 0.804 |
| Social Support Affectionate | 5.00 | 4.00<br>5.00<br>5.00 | 5.00 | 4.00<br>5.00<br>5.00 | 0.886 |

## Dichotomized Predictive Factors and Pain

Chi-squared tests were used to evaluate whether dichotomous predictive factors were associated with maximal pain scores. The results are displayed in Table 6.

Table 6. Bivariate analysis of predictive factors and maximal pain scores

| | Pain < median (n, %) | Pain > median (n, %) | *P* |
|---|---|---|---|
| Tobacco | 4 (67) | 5 (45) | 0.620 |
| Alcohol | 16 (76) | 18 (75) | 0.926 |
| Marijuana | 4 (29) | 4 (44) | 0.657 |
| NSAIDs | 16 (70) | 16 (67) | 0.831 |
| Opioids | 1 (14) | 2 (20) | 1.00 |
| Anxiety | 4 (16) | 7 (28) | 0.306 |
| Depression | 2 (8) | 7 (28) | 0.138 |
| Prior medical abortion | 5 (20) | 1 (4) | 0.189 |
| Prior surgical abortion | 12 (48) | 8 (32) | 0.248 |
| Prior surgical abortion with local anesthesia | 10 (40) | 5 (20) | 0.123 |
| Race (white women) | 4 (16) | 12 (48) | 0.015 |
| Anticipated pain (high) | 18 (72) | 18 (72) | 1.00 |
| Coping with pain (poor) | 4 (16) | 5 (20) | 1.00 |
| Pain provoking anxiety (high) | 4 (16) | 5 (20) | 1.00 |
| Clinic confidence (high) | 15 (63) | 19 (76) | 0.305 |
| Staff confidence (high) | 18 (72) | 22 (88) | 0.157 |
| Provider confidence (high) | 19 (76) | 22 (88) | 0.463 |
| Abortion doubt (high) | 5 (20) | 8 (32) | 0.333 |
| Abortion pressure (high) | 4 (16) | 2 (8) | 0.667 |
| Abortion decision (highly stand by it) | 21 (84) | 22 (88) | 1.00 |
| Abortion burden (low) | 18 (72) | 17 (68) | 0.758 |
| Pregnancy burden (low) | 16 (64) | 13 (52) | 0.390 |
| Abortion priority (high) | 22 (88) | 19 (76) | 0.463 |

For the predictive factors pertaining to drug use in Table 6, we used the data pertaining to use within the past 6 months. We thought it would be more meaningful to evaluate recent use compared to ever use. Race was the only predictive factor that was significantly associated at a p of .015. Predictive factors that had a $p<.20$ were placed in our logistic regression model for analysis. Those predictive factors included: depression, prior medical abortion, prior surgical abortion with local anesthesia, women identifying as white, and confidence in the staff at the clinic. Factors associated with higher pain included: history of depression, women identifying as white, and higher confidence in the staff at the clinic. Factors associated with lower pain included history of prior medical abortion, and history of prior surgical abortion with local anesthesia.

A total of 9 participants reported a history of depression diagnosed by a

healthcare provider. Participants who reported a history of depression were more likely to report pain scores above the median (N=7, 28%) than pain scores below the median (N=2, 8%) (p=0.138). History of depression was associated with an increase in pain scores.

There were 6 participants who reported having a prior medical abortion. Five of these women (N=5, 20%) reported pain below the median, while one (N=1, 4%) reported pain above the median. History of prior medical abortion correlated with decreased pain during their procedure (p=0.189). There were 15 participants who reported history of prior surgical abortion with local anesthesia. Ten of these women (N=10, 40%) reported pain below the median, while 5 (N=5, 20%) reported pain above the median. History of prior surgical abortion under local anesthesia was associated with decreased pain during their current abortion procedure (p=0.123).

The majority of our study population was non-white women. There were 16 women who identified as white. Sixteen percent of white women (N=4) had pain below the median, while 48% (N=12) had pain above the median (p=0.015). White race was associated with increased pain.

The participant's confidence in the staff at the clinic was also evaluated during our study. Confidence in staff was dichotomized based on high and low scores. Women with higher confidence in clinic staff were more likely to have pain scores above the median (N=22, 88%) compared to those with pain scores below the median (N=18, 72%) (p=0.157). Confidence in staff was associated with increased pain.

A history of depression, history of prior medical abortion, history of prior surgical abortion with local anesthesia, white race, and confidence in the clinical staff were

associated with maximal pain at a level of p<0.2. Again, this p-value was used due to the small sample size. These predictive factors were placed into a backwards logistic regression model. See table 7.

Table 7. Variables in the logistic regression model.

| | AOR | Confidence interval | | Sig. |
|---|---|---|---|---|
| | | Lower | Upper | |
| Depression | 2.887 | 0.361 | 23.077 | 0.317 |
| Prior medical abortion | 0.099 | 0.009 | 1.149 | 0.065 |
| Prior surgical abortion with local anesthesia | 0.676 | 0.153 | 2.993 | 0.606 |
| Confidence in clinic staff | 3.828 | 0.708 | 20.703 | 0.119 |
| White race | 5.029 | 0.970 | 26.065 | 0.054 |

$R^2$=0.262

For entry into the logistic model, p=0.05 with removal at p=0.10. The classification cut off was 0.5 with maximum iteration of 20. The backwards regression removed history of depression and history of abortion with local anesthesia. The final model includes: history of prior medical abortion, staff confidence, and white race. See Table 8. This model predicted that women with a history of prior medical abortion were 0.082 times less likely than women without history of medical abortion to report higher maximal pain scores (B=0.082, 95%CI=0.007, 0.994, p=0.049). White women were 6.413 times more likely to report higher maximal pain scores than non-white women with (B=6.413, 95%CI=1.391, 29.572, p=0.017). Women with a higher confidence in the staff at the clinic were 4.392 times more likely to report higher maximal pain scores than those women with lower confidence in the clinical staff (B=4.392, 95%CI=0.846, 22.800, p=0.078), though this value was not significant. The value for R squared is 0.241, indicating that 24.1% of the variance in this model is attributed to the two significant predictive factors.

Table 8. Variables in the final logistic regression model.

| | AOR | Confidence interval | | Sig. |
|---|---|---|---|---|
| | | Lower | Upper | |
| Prior medical abortion | 0.082 | 0.007 | 0.994 | 0.049 |
| Confidence in clinic staff | 4.392 | 0.846 | 22.800 | 0.078 |
| White race | 6.413 | 1.391 | 29.572 | 0.017 |

$R^2$=0.241

# Discussion

We found that history of prior medical abortion and white race had an association with pain that was significant statistically. History of medical abortion was associated with lower pain scores, and white race was associated with higher pain scores. Although not significant, confidence in the staff tended to be associated with increased pain. Coping, self-efficacy, and social support had no bearing on the maximal pain a woman experienced during surgical abortion with local anesthesia.

Our study population consisted of a very diverse group of women. The majority of the women were minorities, with African Americans/Blacks being the predominate race. Most women were not in a relationship at the time of their abortion. These women were of lower socioeconomic status (SES) with 56% (N=28) having a household income of $25,000 or less. Fifty-five percent of the study population was uninsured or had Medicaid/Medicare. It is important to know that Georgia Medicaid does not cover abortion procedures so these women were essentially uninsured for the coverage of their abortion. Despite many of the participants being women of color with multiple barriers to access, these women had high self-efficacy, task coping, and social support. Participation in the RCT required a driver or some means of transportation. Women were not approached for interest in the study until confirmation of financial payment. Most women had a driver, or companion (i.e. partner, friend, parent) accompany them for the

day or be available for transport and support following the procedure regardless of this requirement for eligibility in the study. Despite the potential role these factors may play in preparation for obtaining an abortion, it had no impact on procedural pain for the women who were present in clinic and able to obtain an abortion. Although these social cognitive factors likely play a role in handling the day-to-day social complexities of this unique subset of women, it is unclear if they translate into improvement in pain management for abortion once they have secured access to the procedure.

Prior research showed that although abortion was viewed as a moderately stressful life event, most women who obtained an abortion felt that they had sufficient resources to cope with the abortion, in addition to having a higher perceived self-efficacy [22]. Our study findings were consistent, as we found that most women perceived their self-efficacy to be high, and felt that they would tolerate the procedure well with minimal anxiety regarding abortion-related pain with the procedure. Overall, they felt equipped to cope with the abortion and associated pain. Of the studies that evaluated predictive factors on pain, increased pain was noted among woman with higher expectations of pain, expectation of increased bleeding, and women that were non-white [12]. Women in our study reported more procedural pain and higher maximal pain scores than expected pain scores. Prior literature showed similar findings [12, 13]. Our findings conversely demonstrated increased pain in white women. This difference may be due to our population sample being more diverse than those in previous studies. Self-efficacy did not predict a woman's coping through support seeking [22]. While Bracken et al. demonstrated that the abortion experience was more favorable for older women with perceived (partner) social support [27], other studies failed to show that the presence of

the male partner improved pain [12, 13]. Our findings are congruent, as we did not see an impact on pain with increased social support among our cohort. Singh and colleagues found that one's comfort in their abortion decision did not impact their pain [12], and the findings in our study support this as well. Most of the women in our study viewed their abortion as a high priority and were comfortable with their decision.

History of prior medical abortion decreased the amount of pain that one may experience with surgical abortion under local anesthesia. Our findings demonstrated this with statistical significance. One prior study evaluated abortion history and pain, and demonstrated that prior history of abortion did not impact pain. This study did not identify the type of abortion procedure (medical vs. surgical) [12]. Our study findings differ from prior research as it pertains to the association between depression and pain. Belanger and colleagues found depression to be a predictor of pain [13]. Depression showed no statistical significance to pain in our study.

A prior study demonstrated that women with poor coping experienced more physical complaints [21]. Our study showed no association between coping and maximal pain. Although the coping scales were non-normal, the Task coping scale was relatively high among our population. This may demonstrate increased willingness to cope with obtaining an abortion (task). Our study showed that a woman's confidence in the staff at the clinic tended to impact maximal pain with abortion. Increased confidence in the clinical staff increased pain, though not significant statistically. The impact of one's confidence in the clinic staff and its effect on pain has not been evaluated in the literature. This association may arise from the comfort level that one has when they are in clinic. It may also reflect the counseling for pain expectation, or friendliness of the staff as patients

typically interact with the staff more than the provider (in outside abortion clinics). Comprehensive counseling in preparation for the procedure may increase their confidence in the staff through the display of knowledge, yet also affect their expectation of pain.

Our study was the first to evaluate these constructs as well as other predictive factors on the maximal pain that a woman may experience during a surgical abortion. The nonsignificance of the social constructs and some of the other predictive factors is likely due to the small sample size included in this analysis. The clinical setting and demographic make-up of the study population may also impact the significance of our results. Similar to our study, most of the other studies were conducted at independent clinics. Our study differs in the racial demographics of our participants. Our participants were also of lower SES. Their ability to cope with daily life stressors, or residence in communities with greater support or support services may have increased their scoring on the cognitive scales, and subsequently had no impact on physical pain.

Our study aimed for the most appropriate timing for the administration of our pre- and post-abortion surveys to evaluate social cognitive factors on maximal pain. The timing of the pre-abortion survey was not affected by the administration of the intervention (Gabapentin vs. placebo), as the peak concentration of the drug is 1 hour after administration. The survey was given within minutes of drug intake. The 30-minute post-operative time point is the best predictor for maximal pain as it is the recollection of the worst pain experienced throughout the entire procedure. We believed that utilizing this time point aided in accurately identifying factors that impact pain. We chose a time point after the procedure so that the patient can reflect on the maximal pain that they

recalled. The median score for maximal pain recalled was less than the median scores during the intraoperative time points. This score was also closer to the expected pain score. The maximal pain score recalled was intended to identify the highest pain felt thus far (from start of the clinic to the recovery room). The fact that this pain score is lower than scores identified intraoperatively may indicate that the pain experienced is not as intense as reported after the desired outcome (abortion) is achieved. It indicates that when looking back on the pain during the procedure, it may not be recalled as bad as they once reported it to be. This may also imply that coping and other predictive factors impact the pain that one may recall during the experience once the pain stimulus is removed.

Another strength of the study is our novel approach to determine social cognitive predictors on pain. Our subsequent findings thus far, suggest that there may be association between being white and having a history of prior medical abortion and its impact on pain. The potential to expand our findings with continued efforts on this study encourage us to continue to evaluate pain predictors to determine if a standardized checklist can be formulated to identify those women at increased risk of pain during first trimester surgical abortion under local anesthesia. This checklist can compute a score for those women that are at increased risk of pain. These women can then undergo additional counseling to further explain expectations of pain, and the potential increased pain risk based on their composite score from the checklist. This checklist can be utilized by outside abortion clinics as well as clinical abortion providers to help counsel and identify women at increased risk of more moderate to severe pain with surgical abortion. The woman can then be offered other pain modalities (PO sedation), encouraged to

choose IV sedation, or at least have more thorough counseling regarding pain expectation. This additional checklist and time spent counseling should not interfere with busy clinic flow. The additional time needed will ultimately help those at increased risk and make the experience more tolerable for patient and provider. Currently, the specifics of this list are not clear. The list should definitely include reproductive history and inquire about prior medical vs. surgical abortion. The list should have demographic information including race. Psychiatric history should be evaluated. Perhaps a common question to identify history of mental illness would be helpful compared to screening questions to evaluate current mental illness such as depression or anxiety. Further investigation is needed to determine how comprehensive the list should be, taking into account administration time and who will facilitate review of the checklist with the patient.

Our study population was majority African American. Approximately 2/3 of the population was non-white. Our racial demographic is consistent with other studies done at this clinic due to the racial make up of Atlanta. This diverse demographic offers strength to our data as other studies did not have large minority communities. This may explain why race was determined to impact pain, but with white woman having increased pain scores.

Having a small sample size is one of the limitations of our study. The small sample size of 50 participants limited our ability to find statistical significance in other potential factors that may mediate pain. Pain is highly subjective. Although our pain scales have been studied in prior abortion research, there may be limitations due to the variability of scales that deal with pain perception. We did increase our p-value for

inclusion of as many predictive factors as possible to include in our logistic regression model. Also, the results from our analysis only show associations, and not temporal causation. We had difficulty in recruiting patients for our study. Not having a driver was our largest barrier for recruitment eligibility, followed by no interest in participating in research, and inability or unwillingness to take an additional medication (study intervention for the RCT). Women who drove themselves, and saw no perceived benefit to taking additional medication, may have a higher self-efficacy. Therefore, the study participants may be biased in that their self-efficacy is lower at baseline than non-participants. This may also be true for social support as the majority of participants had a support person accompany them as a driver.

Further investigation is warranted to determine clinical significance of these social cognitive constructs and other predictive pain factors on pain scores during surgical abortion. As recruitment continues for the RCT, we will continue the cross-sectional survey as well. We hope that the increased sample size will aid in our effort to determine further findings with statistical significance. Our ultimate goal is to investigate innovative alternatives to pain management and devise other strategies to help identify women at increased pain risk in order to improve the experience for the many women who undergo surgical abortion each year.

Reference:


1. Finer, L.B. and M.R. Zolna, *Declines in Unintended Pregnancy in the United States, 2008-2011.* N Engl J Med, 2016. **374**(9): p. 843-52.
2. Jones, R.K. and J. Jerman, *Abortion Incidence and Service Availability In the United States, 2014.* Perspect Sex Reprod Health, 2017. **49**(1): p. 17-27.
3. Jones, R.K. and J. Jerman, *Abortion incidence and service availability in the United States, 2011.* Perspect Sex Reprod Health, 2014. **46**(1): p. 3-14.
4. Jones, R.K. and M.L. Kavanaugh, *Changes in abortion rates between 2000 and 2008 and lifetime incidence of abortion.* Obstet Gynecol, 2011. **117**(6): p. 1358-66.
5. Jerman, J., R.K. Jones, and T. Onda, *Characteristics of U.S Abortion Patients in 2014 and Changes Since 2008.* Guttmacher Institute, 2016.
6. *Induced Abortion in the United States.* Guttmacher Institute, 2017.
7. Karasahin, K.E. and U. Keskin, *Pain and abortion.* Contraception, 2011. **84**(3): p. 337.
8. Glantz, J.C. and S. Shomento, *Comparison of paracervical block techniques during first trimester pregnancy termination.* Int J Gynaecol Obstet, 2001. **72**(2): p. 171-8.
9. Higginbotham, S.L., *The SFP research priority setting process.* Contraception, 2015. **92**(4): p. 282-8.
10. Ireland, L.D. and R.H. Allen, *Pain Management for Gynecologic Procedures in the Office.* Obstet Gynecol Surv, 2016. **71**(2): p. 89-98.
11. Stubblefield, P.G., *Control of pain for women undergoing abortion.* Suppl Int J Gynecol Obstet, 1989. **3**: p. 131-40.
12. Singh, R.H., et al., *Predictors and perception of pain in women undergoing first trimester surgical abortion.* Contraception, 2008. **78**(2): p. 155-161.
13. Belanger, E., R. Melzack, and P. Lauzon, *Pain of first-trimester abortion: a study of psychosocial and medical predictors.* Pain, 1989. **36**: p. 339-350.
14. Borgatta, L. and D. Nickinovich, *Pain during early abortion.* J Reprod Med, 1997. **42**(5): p. 287-93.
15. Renner, R.M., et al., *Pain control in first-trimester surgical abortion: a systematic review of randomized controlled trials.* Contraception, 2010. **81**(5): p. 372-88.
16. Glanz, K., *Health behavior: Theory, research, and practice*. 2015: John Wiley & Sons.
17. Gochman, D.S., *Labels, systems and motives: some perspectives for future research and programs.* Health education quarterly, 1982. **9**(2-3): p. 167-174.
18. Gochman, D., *Health behavior research: definitions and diversity. W: Gochman DS (eds.) Handbook of Health Behavior Research. Vol. 1. Personal and Social Determinants*. 1997, Plenum Press, New York.
19. Clarke, H., et al., *The prevention of chronic postsurgical pain using gabapentin and pregabalin: a combined systematic review and meta-analysis.* Anesth Analg, 2012. **115**(2): p. 428-42.

20. Renner, R.M., et al., *Paracervical block for pain control in first-trimester surgical abortion: a randomized controlled trial.* Obstet Gynecol, 2012. **119**(5): p. 1030-7.
21. Major, B., P. Mueller, and K. Hildebrandt, *Attributions, expectations, and coping with abortion.* Journal of Personality and Social Psychology, 1985. **48**(3): p. 585-599.
22. Major, B., et al., *Personal resilience, cognitive appraisals, and coping: An integrative model of adjustment to abortion.* Journal of Personality and Social Psychology, 1998. **74**(3): p. 735-752.
23. Cozzarelli, C., N. Sumer, and B. Major, *Mental models of attachment and coping with abortion.* Journal of Personality and Social Psychology, 1998. **74**(2): p. 453-467.
24. Cozzarelli, C., *Personality and self-efficacy as predictors of coping with abortion.* Journal of Personality and Social Psychology, 1993. **65**(6): p. 1224-1236.
25. Faure, S. and H. Loxton, *Anxiety, depression and self-efficacy levels of women undergoing first trimester abortion.* South African Journal of Psychology, 2003. **33**(1): p. 28-38.
26. Foster, D.G., H. Gould, and K. Kimport, *How women anticipate coping after an abortion.* Contraception. **86**(1): p. 84-90.
27. Bracken, M.B., M. Hachamovitch, and G. Grossman, *The decision to abort and psychological sequelae.* The Journal of nervous and mental disease, 1974. **2**(158): p. 154-162.
28. Tiippana, E.M., et al., *Do surgical patients benefit from perioperative gabapentin/pregabalin? A systematic review of efficacy and safety.* Anesth Analg, 2007. **104**(6): p. 1545-56, table of contents.
29. Schwarzer, R. and M. Jerusalem, *The general self-efficacy scale (GSE).* Anxiety, Stress, and Coping, 2010. **12**: p. 329-345.
30. Endler, N.S. and J. Parker, *Coping inventory for stressful situations*. 1990: Multi-Health systems Incorporated.
31. Golpelwar, M., *Action and cognition in task oriented coping: Factor structure and internal consistency of the CISS-21 with an Indian sample*. 2014, PeerJ PrePrints.
32. Sherbourne, C.D. and A.L. Stewart, *The MOS social support survey.* Soc Sci Med, 1991. **32**(6): p. 705-14.
33. Levine, E.G., S. Vong, and G.J. Yoo, *Development and Initial Validation of a Spiritual Support Subscale for the MOS Social Support Survey.* J Relig Health, 2015. **54**(6): p. 2355-66.
34. van Ditzhuijzen, J., et al., *The impact of psychiatric history on women's pre- and postabortion experiences.* Contraception, 2015. **92**(3): p. 246-253.