

Examining the Influence of Nature Stimulus in Enhancing Labor Experience in LDR
Units

By
Rehab A. Aburas

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Debajyoti Pati, PHD, FIIA, IDEC, LEED AP
Committee Chair

Kristi S. Gaines, Ph.D., IIDA, IDEC, EDRA
Nicole Gilinsky Adams, Ph.D.
Robert Casanova, M.D

Mark Sheridan
Dean of the Graduate School

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ABSTRACT

The physical environment is one of the factors that affect women's experience of labor. The basics of the childbirth process have not changed since the beginning of human existence; however, the environment in which women today give birth has changed significantly (Butani & Hodnett, 1980). One study found that 94% of women thought that the physical environment affected how easy or difficult giving birth was. However, the literature on the impact of interior/architectural design on women's birth experience is limited (Newburn & Singh, 2003). Incorporating design elements and strategies that calm and reduce negative outcomes may create positive experiences for women in labor. The purpose of this study is to examine the impact of one such strategy, namely the presentation of images of nature, on the labor and delivery experience. The sample consisted of 50 women in labor. The participants were recruited during prenatal classes offered at a birth center in Lubbock, TX, and from Health Point clinic in the same city. The sample were divided randomly into two groups, A and B. Group A is the control group with no exposure to images of nature. Group B had the opportunity to view images of nature displayed on the labor and delivery room TV. After delivery, all participants were given two questionnaires. The first questionnaire is a demographic one, and the second is a sub-scale adapted from the questionnaire of Quality from Patients' Perspective (QPP). In addition, vital signs (including blood pressure and heart rate), use of Epidural and pain relief medications, and Apgar score were examined from the subjects' medical records. The study findings showed that the experimental condition has a higher score on the QPP sub-scale, Group A $m=4.46$, Group B $m=4.63$. In addition, there is a positive correlation between hours of viewing Nature video and QPP mean scores. The analysis showed an increase of the QPP scores associated with the increase of Nature TV watching time, QPP mean of watching time (less than an hour) Group $m=4.5$, QPP mean of watching time (more than 3 hours) $m=4.8$. Pearson's correlation showed a significant negative relationship between QPP means scores and pain medications $r=-.341$, $p=.039$. This finding emphasized the importance of incorporating non-pharmacological techniques to the LDR units to sooth the pain. Adding Nature imagery to the LDR environment

can be one of these techniques. The mean score for the heart rate was lower in the experimental condition $m= 84.60$, control condition $m= 90.49$. For Apgar score, the mean scores were higher for the experimental Group A $m= 8.65$, Group B $m=8.92$. The previous findings support the study hypothesis, which is the nature images influence the labor experience positively.

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CHAPTER I

INTRODUCTION

Evidence suggests that the physical environment is one of the factors affecting women's experience of labor (Newburn & Singh, 2003). Newton and Newton (1962) found that being relaxed, having good communication with the staff, and receiving proper physical care during labor affect women's satisfaction with their babies at first sight (as cited in Butani & Hodnett, 1980). This means that the satisfaction with labor experience does not only affect mothers' outlook toward themselves, but also their attitudes about their children (Butani & Hodnett, 1980). Supportive environments have several benefits for patients such as promoting patients' health and psychological functions, reducing their stress, and decreasing physiologic arousal (Taylor & Repetti, 1997). In addition, the quality of support from caregivers affects the woman's ability to cope with the stresses of labor, with potential effects on self-esteem and postpartum depression (Hodnett, 2000). The basics of the childbirth process have not changed since the beginning of human existence. However, the environment in which women today give birth has changed significantly (Butani & Hodnett, 1980). In addition, the focus on designing healthcare facilities is changing from an emphasis on the functional delivery of care towards healing environments, which are also psychologically supportive (Dijkstra, Pieterse, & Pruyn, 2006). One study reports that women have clear preferences about the type of environment, facilities, and controls they want for maximum comfort and support during labor. However, a significant gap has been found between the facilities women would like and what is available

(Newburn & Singh, 2003). For instance, having a window in the room, or adding a beautiful or interesting view was one of the factors that was emphasized by many women. However, an open window can be perceived as lack of privacy, and may be kept closed at all times. . The fact that paintings, posters, and music may help women take their minds off the pain associated with contractions as Newburn and Singh suggested (2003) makes these types of distractions a good fit for labor and delivery rooms.

Literature suggests several factors affect women's satisfaction with the labor experience, such as sense of control, labor duration, labor pain, and social interaction. Also, different techniques and exercises have been proposed to achieve positive outcomes during labor and increase patient satisfaction. These techniques include educational or antenatal classes, relaxation techniques, breathing exercises, music, aromatherapy, and massage therapy. Literature shows that women's bodies perform better during labor when they feel more relaxed and comfortable (Rubenzer, 2008).

Antenatal education classes provide information about labor and birth and ways of coping with pain and emotional distress (Spiby, Slade, Henderson & Fraser, 2003). In one study, first-time mothers stated that childbirth classes helped prepare them for childbirth. However, there were no significant differences between participants and non-participants regarding memory of labor pain, mode of delivery, and overall experience of childbirth (Fabian, Rådestad, & Waldenstrom, 2005). Breathing and relaxation exercises were discussed in literature as helpful techniques during childbirth. Women who expected breathing and relaxation exercises to be

helpful during labor were more likely to find them so, and they were more satisfied than women without these expectations (Green et al., 1990). Spiby et al. investigated the use of several coping strategies including relaxation techniques, breathing exercises, and a range of positions to assist both physical and emotional aspects of labor. The authors recommended coping strategies be included among the methods that women can use to soothe pain and psychological distress in labor (Spiby et al., 2003). Previous studies also emphasize the positive outcomes of calming music. Phumdoung and Good (2003) report that soft music decreased both sensation and distress of active labor pain in the first 3 hours. Aromatherapy is another technique used to calm women in labor. Women reported aromatherapy as helpful in their labor experience, and there was a lower Epidural rate and opioid injection rate in the aromatherapy group (Burns, 2002).

The aforementioned techniques have been used to improve the delivery experience, but no one has examined the potential use of biophilic imagery as a potential tool. Based on research in other areas such as acute care settings, there is a possibility that biophilic visual stimulus may help reduce stress and perceived pain during child birth, thereby improving the patient's experience. For example, exposure to nature sights and sounds before, during, and after bronchoscopy was found to be a safe, inexpensive way to enhance analgesia, with none of the risks or side effects caused by medications (Diette, Lechtzin, Haponik, Devrotes & Rubin, 2003). In another example, Ulrich conducted a preliminary study to investigate the effect of art walls in the psychiatric ward at a Swedish hospital. The area was decorated with

paintings in a variety of styles and themes. Unstructured interviews revealed that patients had positive attitudes toward paintings inspired by nature content such as landscape and still life (Ulrich, 1990). Additionally, Nanda, Chanaud, Nelson, Zhu, Bajema and Jansen (2011) conducted a study to analyze the effect of visual art related to nature theme (still and video) on patients' and visitors' behavior in Emergency Department (ED) waiting rooms. The study found, through systemic behavioral observation, that providing positive distraction can impact patient experience by reducing anxiety and stress (Nanda et al., 2011). Furthermore, a study by Pati and Nanda (2011) suggests that the use of positive distractions can affect the stress and anxiety associated with the waiting experience. Based on the positive impact of nature in previous studies, could incorporating positive distraction in the labor room help in reducing stress associating with waiting, especially with the increase of labor hours?

The biophilia hypothesis suggests that the ability to identify healthy natural environments is a survival advantage. Therefore, this ability has been promoted by natural selection during the evolution of modern humans and is satisfied with positive emotional responses (Wilson, 1948; as cited Lankston et al., 2010). "Biophilia is the inherent human inclination to affiliate with natural systems and processes, especially life and life-like features of the nonhuman environment" (Kellert, 2008, p.3). Exposure to natural scenes such as landscapes, according to Stress Reduction Theory SRT, helps moderate and diminish states of negative thoughts within minutes, through psycho-physiological pathways (Bratman, Hamilton, & Daily, 2012). Finding ways to incorporate nature in design can be done by integrating natural materials and organic

shapes into the design (Huelate, 2008). Finally, biophilic designs have a powerful impact and are appreciated by patients, staff, and families. The challenge is to create healthcare settings using biophilic design features that satisfy people's love of nature and support the healing process (Huelate, 2008). Some studies found the nature impact was stronger among women (Grinde & Patil, 2009). For example, a study showed that a panoramic view of nature had a consistently more positive impact on the physical health of women at a rehabilitation center in Røros, Norway than men (Raanaas, Patil, & Hartig, 2012). Another study indicated that female participants showed better results in task performance, felt less distracted and had greater feelings of familiarity when a leafy plant was in the room (Shibata & Suzuki, 2002).

A positive distraction can be defined as "an environmental feature or element that elicits positive feelings, holds attention and interest without taxing or stressing the individual, and therefore may block or reduce worrisome thoughts" (Ulrich, 1981; Ulrich, 1991, p. 102). It also can be defined as "the ability to allow the individual to shift focus from negative foci within the health environment to the more restorative aspects of the non-medical world" (Shepley, 2006, p. 34). For instance, providing patients, families, and staff with access to nature by adding indoor and outdoor gardens, views of natural scenes through windows, and artwork of natural themes can reduce stress (Schweitzer et al., 2004). Also, patients with nature images have less anxiety and require fewer strong pain medications (Ulrich, 1991).

This evidence suggests that introducing natural images into labor and delivery rooms may serve as a relaxation and stress reduction technique. Some studies in LDR

settings provide support for this contention. For instance, Newburn & Singh (2003) proposed that paintings, posters, or music could help patients take their minds off the pain during contractions. One woman in their study noted, "The wall I was staring at got fairly boring; it would have been good to have things to look at on the walls" (Newburn & Singh, 2003). Positive distractions, such as what the woman was requesting in the labor and delivery room, can be incorporated in several forms such as nature imagery on hung wall art or on a TV or DVD. Hodnett, Stremler, Weston and McKeever (2009) provided women in labor with the option of using a projector to show DVDs of movies, or of ocean beaches and mountain waterfalls on the wall. Twenty-five women (86.2%) reported they used the DVDs of nature. However, the possible beneficial impact of the DVDs was not examined in the study. Another example is a study by Cusack, Lankston and Isles (2010) that was conducted to find out which factors of the waiting area were considered important to the patients' experience while attending a transplant clinic in Dumfries. The study showed that patients rated paintings and TVs as having the same degree of importance. None of the studies, however, included any systematic examination of potential associations between visual nature stimulus and patient outcomes.

Conceptual Framework.

Biophilia

According to Wilson (1948) the biophilia hypothesis suggests that the ability to identify healthy natural environments is a survival advantage. Therefore, this ability has been promoted by natural selection during the evolution of modern humans and is

satisfied with positive emotional responses (as cited in Lankston et al., 2010).

Including elements of nature to occupied areas can provoke positive changes in cognition and emotion, which may influence stress level, health and wellbeing (Grinde & Patil, 2009). A considerable amount of studies have been carried out to investigate the impact of adding elements of nature to several settings such as offices and hospitals. This study adapted the biophilia hypothesis by adding TVs displaying nature imagery in labor and delivery rooms.

Supportive design

According to Ulrich (1991), healthcare environments support dealing with stress and support wellness if they are designed to adopt a sense of control, access to social support, and access to positive distractions in physical surroundings. The quality of a woman's birth experience could influence her stress. Satisfaction with the labor and delivery experience was associated with less Post-Partum Psychosis, and better coping with life (Quine et al., 1993). The level of stress and physiologic arousal can be reduced by creating supportive environments, as well as promoting health and psychological functions (Taylor & Repetti, 1997). Newton and Newton (1962) suggested that having good communication between the mother and the staff, being relaxed, and receiving good physical care during labor are some of the factors that affect women's satisfaction with the labor experience (as cited in Butani & Hodnett, 1980). This study examined the effect of nature imagery as a type of positive distraction in the Labor and Delivery Room (LDR), which will help create a supportive environment for women in birth centers.

Research Objective

The specific aim of this study is to examine the impact of visual nature stimuli on women during labor and delivery. The study hypothesis was that introducing nature-based images in labor and delivery rooms may have a positive impact on women's satisfaction with the labor experience.

The study addresses the following main question:

Is exposure to nature stimulus associated with an increase in positive labor experience?

In addition, the following sub-questions will be addressed in this study:

Question 1: Did the participants in the experimental condition achieve higher QPP scores than participants in the control condition?

Question 2: Does nature stimulus have an impact on women's labor duration in the control group and the group of women who watch the nature images TV?

Question 3: Is there a difference in the vital signs between the two groups?

Question 4: Is the Epidural or pain medications usage lower in the experimental group than in the control group?

Question 5: Are the Apgar scores higher in the experimental group than in the control group?

Importance of the Study

Studies report that women have clear preferences about the type of environment and facilities they want for maximum comfort and support during labor. However, a significant gap has been found between the facilities women would like

and what is available (Newburn & Singh, 2003). In addition, much of the research focuses on one specific psychological outcome such as satisfaction or postnatal depression. A limited amount of literature looked at different psychological outcomes and its interactions for the same women (Green et al., 1990).

Moreover, according to an analysis of nearly 140,000 deliveries conducted by researchers at the National Institutes of Health, women take a longer time to give birth today than did women 50 years ago. They found that the first stage of labor has increased by 2.6 hours for first-time mothers. The researchers could not identify all the factors that caused the increase, but concluded that it is likely due to changes in delivery room practice (NIH News, 2012). Women delay their motherhood owing to their education and career plans; childbirth and the birthing experience has assumed more importance in contemporary families. Delayed childbearing could increase the risk of low birth weight, preterm delivery, miscarriage, and Down's syndrome (Maheshwari, Porter, Shetty & Bhattacharya, 2008). Healthcare organizations should create environments that encourage repeat visits to increase profit (Fottler, & Ford, 2000). It is very important for administrators, policymakers and providers to understand women's satisfaction with their childbirth experience as an indicator of maternity care quality (Hodnett, 2002).

CHAPTER II

REVIEW OF LITERATURE

“Labor and birth include intense physical, emotional, psychological, developmental, social, cultural, and spiritual elements that may be critical to an individual woman’s experience of this major life event” (Lowe, 1996, p.82). Evidence suggests that the physical environment is one of the factors that affects women’s experience of labor (Newburn & Singh, 2003). Environments characterized by supportive relationships play a role in reducing stress, enhancing psychological function and reducing physiologic arousal (Taylor & Repetti, 1997). According to Ulrich (1991), healthcare environments will support dealing with stress and promote wellness if they are designed to nurture a sense of control, access to social support, and access to positive distractions in living spaces. The following section discusses several factors related to environmental design such as privacy, noise, control, lighting, color and their relationship to childbirth settings.

In the context of LDR settings, in general, three factors have been associated with women’s overall labor and birth experiences in literature: perceived control, social support, and pain (Waldenstrom, 1999). Another factor associated with the labor experience is a woman's expectation during pregnancy. It was found that expectations during pregnancy are associated with the experience of the same aspect while giving birth. For instance, having positive emotional expectations in labor are associated with experiencing positive emotions in labor (Ayers & Pickering, 2005).

An Overview of Factors Affecting Women Labor Experience

A woman's satisfaction with her childbirth experience could have a continuing impact on her wellbeing and her relationship with her baby (Goodman et al., 2004). The following section explains the most important aspects of patients' satisfaction with the healthcare experience in general. It also explains these aspects in relation with women's labor satisfaction experience in particular.

Control

Williams Anne & Irurita Vera (2005) suggest that the therapeutic potential of the hospital environment can be enhanced by increasing personal control and emotional comfort of patients (as cited Suter & Baylin, 2007). According to Kitzinger (2000, p.8) "each woman having a baby in a hospital is transformed into a patient. The admission procedure marks the point at which the institution takes control over her body". These feelings of losing control stress women and affect their evaluation of the labor experience. In the literature, lack of control is associated with negative outcomes such as depression, high blood pressure, and a reduced immune system (Ulrich, 1991).

The major influence of control on women during labor has been documented in the obstetrics field by academics and physicians (Hodnett & Simmons-Tropea, 1987). One study found that women associated a positive childbirth experience with the level of personal control they felt during labor (Butani & Hodnett, 1980). In contrast, losing personal control, or control over their environment, was associated with a decrease of women's labor experience satisfaction, and with low post-delivery psychological health (Green, Coupland & Kitzinger, 1990). Goodman, Mackey and Tavakoli (2004)

stressed personal control during childbirth as an important aspect in women's satisfaction with the childbirth experience. For instance, women had regrets about how they performed during childbirth because of a loss of control (Butani& Hodnet, 1993). Control during labor is affected by several environmental aspects, such as routines of the healthcare setting, staff and caregivers' outlook, oxytocin induction, the fetal monitor, and the settings' design (Hodnett, 1982). Studies also discussed other factors affecting self-control during labor, such as attending childbirth education classes (Hart& Foster, 1996), labor duration, self-esteem, social support, and women's educational background. There was a relationship between whether or not control is important to women and their educational preparation. Women who had childbirth preparation were more satisfied with their labor experience than those who did not have childbirth preparation (Butani& Hodnet, 1993). Another advantage of childbirth preparation is to ensure women get realistic expectations for the labor experience and to explain several techniques for maintaining control during labor (Butani& Hodnet, 1993). This supports Hart and Foster's (1996) suggestion to transfer the emphasis of educational classes from how to deal with pain to understanding the labor process and how to achieve a sense of control during childbirth.

Another factor affecting women's control during childbirth is the length of their labor. The feeling of control was decreased for women who had long or difficult labors (Green, Coupland, & Kitzinger, 1990). However, some women experienced difficulties during labor, but still achieved a sense of control. Therefore, achieving a sense of control during labor is determined by a mother's psychological state rather than her circumstances. (Green et al., 1990). Research shows that people who have a

sense of control cope better with stress and have better health than people who do not feel in control (Fouts & Gabay, 2008).

Creating private rooms and giving patients' the ability to control the temperature and lighting enhances the labor experience (Schweitzer, Gilpin & Frampton, 2004; Lowe, 1996; Newburn and Singh, 2003). Healthcare design characteristics that improve patients' control tend to reduce stress and improve other outcomes. Examples of design suggestions that promote feelings of control include providing bedside dimmers, privacy in imaging areas, televisions controllable by individual patients, choice of music, accessible gardens, and architectural design and signs that make finding their way easier in large hospitals (Ulrich, 1991, 2000). In addition, allowing patients to decorate their hospital room with an art print of their choice helps give them a sense of control (Suter & Baylin, 2007).

In general, personal control during labor is one of the significant factors that affect women's childbirth satisfaction. Therefore, nurses and caregivers should support women to organize and achieve self-control and the environment should be created to meet her expectations (Goodman et al., 2004). Since visual stimulus constitutes about 80 percent of human perception, it may be argued that obtaining some control over the visual field around the birthing process may enhance overall perception of control for a patient.

Social Support

Social support could engage different strategies, varying from support by the person's family members, support by other patients, and support by caregivers.

Research has shown that perceiving high social support reduces stress and promotes

wellness (Shumaker and Czajkowski, 1994; Cohen and Syme, 1985; Sarason and Sarason, 1985) (as cited in Ulrich, 1991). It also was established that having supportive caregivers and staff is associated with the level of satisfaction of couples during labor (Hung & Lee, 1997). Social support improved the recovery outcomes in several categories of patients and affects survival length in patients with metastatic cancer (Spiegel et al. 1989). Social spaces can also impact behaviors and healthcare use (Taylor & Repetti, 1997). However, some hospitals still have restrictive visiting hours, especially in critical care areas.

In addition, there are some design solutions for better social interactions such as furniture arrangements, especially in waiting areas and lounges. Also, providing comfortable waiting areas with movable seating, convenient access to food and rest rooms, and attractive gardens with sitting areas could encourage social interactions (Ulrich, 1991, 2000). The material choices also affected the social interaction. Harris (2000) found that family and friends spent more time visiting rehabilitating patients when patient rooms' floors were carpeted instead of covered in vinyl composition (as cited in Ulich, 2000).

In labor and delivery rooms, a birth environment that is characterized with elements such as privacy, warmth and social support appears to connect with primitive brain processes during childbirth and affect women positively (England & Horowitz, 1998, p.199). In addition, one study found that a positive labor experience was associated with a husband's presence, encouragement and support (Makey, 1998). However, in another study, women evaluated support from staff as more important to them than support from their husbands (Waldenstrom et al, 1996). Also, a significant

decrease in labor duration and complications was reported among women who had a supportive person, such as a doula, with them during labor (Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993).

Lefler et al (1986) and Schuster et al (1990) found that women could undergo psychological consequences when they experience a lack of social support from their families and their friends (as cited in Taylor, & Repetti, 1997). One of the design suggestions is to create a “family zone” on the side of the patient’s bed, away from the doorway, with comfortable furniture and storage space (Cesario, 2009). Literature documents a variety of negative health outcomes that increase in individuals who live in a limited social environment, either structurally or functionally (Berkman 1995, Broadhead et al 1983) (as cited in Taylor & Repetti, 1997). Therefore, design should encourage social support and interaction to avoid negative health consequences.

Communication

Communication is one of the social support elements that is considered a coping strategy that can decrease negative psychological outcomes such as stress and anxiety (Mills & Sullivan, 1999). Communication in labor and delivery rooms is a crucial issue affecting mothers’ and babies’ safety and it is important at every stage of labor (Schwarzmann, Mease & Tollefson, 2010). Also, an increase in patients’ sense of control and engagement in decision-making was associated with communication (Mills & Sullivan, 1999; Green et al., 1990). One study found that women’s satisfaction with the labor experience was decreased when they were able to hear noises, especially in double rooms (Schweitzer, Gilpin & Frampton, 2004), which also could interrupt communication. Women who remain informed and were able to

discuss their labor issues with caregivers evaluated their labor experience positively and they were more satisfied and happier with their experience (Green et al., 1990).

Quine et al., (1993) indicated the importance of communication in the childbirth process. Healthcare professionals and caregivers must be trained to improve their communications, and to give clear information for women during the pregnancy and the process of labor (Quine et al., 1993). However, communication during labor and the birth process has received little research attention (Simpson, James, & Knox, 2006).

Pain Management

“Labor pain is the result of a complex and subjective interaction of multiple physiologic and psychological factors on a woman’s individual interpretation of labor stimuli” (Lowe, 1996, p.82). Pain and loss of control are most frequently named as the characteristics of an unpleasant childbirth experience (Hodnett, 1980). In one study, women considered pain to be the worst part of the childbirth (Mackey, 1998). Pain management during labor is associated with the satisfactory evaluation of their performance during labor (Mackey, 1995). When the labor process starts, the cognitive activities of the woman impacts her pain perceptions, which also may impact her labor progress (Lowe, 1996). Anxiety is one of the common causes of increased labor pain. Some psychological factors can cause anxiety, such as fear of pain, fear of losing control, and fear of harm for the mother or the baby. Also, some environmental elements, including excessive noises and being unfamiliar with the space, could also increase anxiety. Elements of the environment that improve women’s experience

include the familiarity with environment, the noise level, a supportive environment, being allowed to move and walk, and lighting and temperature control (Lowe, 1996). Since adding a leafy plant to spaces showed an increase in feelings of familiarity among women (Shibata & Suzuki, 2002), this design may also work in labor and delivery rooms to increase familiarity and reduce pain. Morse and Park (1988) examined the difference in perceiving pain between women who chose home delivery to those who chose hospital delivery. The study findings showed that pain ratings were significantly higher in the hospital group (Lowe, 1996).

Studies also showed some cultural differences in women's rating of pain and their behavior during labor (Lowe, 1996). For instance, a study by Weisenberg and Caspi (1989) found differences in the rating and response to pain among women from a Middle-Eastern background and women from a Western background. The study reported a high rate of pain in both groups. However, the Middle-Eastern women showed more behavior that indicates pain than Western women (Lowe, 1996).

Women have been encouraged to use non-pharmacologic methods, such as Lamaze classes, during labor for their effect on promoting control and achieving higher satisfaction with the experience (Mackey, 1995). The most common non-pharmacologic technique to control pain that was discussed in literature is relaxation. Relaxation works through several mechanisms, including reducing anxiety and muscle tension, decreasing the catecholamine response, and improving uterine blood flow (Lowe, 1996, p. 89).

Childbirth is one of the most challenging life events. Continued investigation is required to explore pain-relief options that are safe and effective in enhancing women's satisfaction with the experience (Brown, Douglas & Flood, 2001).

Privacy

The design of healthcare settings should balance between the need for privacy among patients and families and the need of visual accessibility for caregivers. Healthcare providers need a complete visual access to patients, especially the ones in acute conditions. Supporting privacy decreases family anxiety, which increases their participation, thus promoting family-centered care (Altimier, 2004). Women were asked to rate the importance of 25 different physical environment features during labor (low, medium, or high importance). One of the most important features was achieving the desired level of privacy from others (Newburn & Singh, 2003). A peaceful, private environment was also reported as one of the aspects of the labor and delivery rooms that was most critical to women's satisfaction (Singh & Newburn, 2006). Another study evaluated couples' satisfaction with provided care during labor and delivery (Hung & Lee, 1997). One of the most important aspects of couples' satisfaction was "privacy during medical examination" (p.259). A single room supports the required level of privacy that women want and reduces noise. Patients who can control the amount of privacy, the number or frequency of visits, the surrounding sounds, and the timing and content of meals will experience less stress and will likely heal faster (Felgen, 2004).

Noise

Noise is associated with increased blood pressure and heart rate, pain and anxiety (Schweitzer, Gilpin & Frampton, 2004). The elimination of loud noises, as well as the implementation of therapeutic sounds, benefits the staff, patients, and families. One of the techniques that is used to reduce noise is music. Music therapy was incorporated in some units to add a relaxation technique to the environment. This type of therapy shows positive results for infants, families and staff as well (Altimier, 2004). Noise interrupts patient sleep and confidentiality, causes fear, and interferes with communication. In addition, excessive noise in double rooms influences women's satisfaction with their labor experience (Schweitzer et al., 2004). Women considered not being able to hear other women in labor as one of the most important features of their physical environment (Newburn & Singh, 2003).

The physical environment of LDR

Literature identified several factors associated with the labor experience satisfaction. For example, one study asked women to rate the importance of 25 different features of the physical environment during labor (Newburn and Singh, 2003). The study found that women emphasized several environmental characteristics, such as accessibility to the toilet, control over the environment, temperature, and lighting control. The top three features in order of importance were: having a clean room, being able to walk around, and privacy. Next in importance was being able to stay in the same room throughout the labor, and providing a space for the family or the childbirth companions with comfortable chairs (Newburn and Singh, 2003, p.5).

Table 2.1. Importance of 25 different features of the physical environment during labor in Newburn and Singh study (Newburn and Singh, 2003, p.6).

Feature	low impt	med impt		high impt
	mean % score (/3)	%		%
Clean room	1	7	92	2.9
Able to walk around	1	9	89	2.9
Not be in sight of or overlooked by others	2	9	89	2.9
Be able to stay in same room throughout	4	15	82	2.8
Comfortable chair for birth partner(s)	4	24	72	2.7
En suite toilet	8	22	70	2.6
Able to control who comes into the room	5	26	69	2.6
Bean bags, pillows and mats to use	6	29	65	2.6
Unable to hear other women giving birth	11	25	64	2.5
Able to control the brightness of the light	7	38	56	2.5
Easy access to snacks and drinks	10	37	53	2.4
Homely looking room (not hospital like)	12	35	52	2.4
Able to control the temperature	6	45	49	2.4
En suite bath	18	32	50	2.3
Sure others could not hear	20	32	48	2.3
Pleasant place to walk	13	47	40	2.3
En suite shower	24	33	43	2.2
Know resus equip is near, but not see it	20	38	42	2.2
Birth pool	21	42	37	2.2
Able to move furniture around to suit	21	36	42	2.2
Nicely decorated room	15	49	35	2.2
Hospital bed	35	33	32	2.0
Clock easily in view	37	31	32	1.9
Divan bed	50	39	11	1.6
Able to see resus or other equipment	57	32	11	1.5

Space Planning for the LDR

The LDRs are divided into three zones: family, patient, and staff. The following section explains several considerations regarding space planning and furniture arrangement for the LDR Units within the Military Health System (MHS). However, these recommendations can be approached as general suggestions to be applied in any labor and delivery room:

- Provide space for a patient's personal items, such as a storage area or shelves.
- Provide overnight accommodation for one guest within the patient room that includes internet access, TV and locked storage.
- Provide same-handed patient rooms where appropriate.
- Control sound transmission between rooms.
- Maximize non-institutional design features to provide a more therapeutic healing environment.
- Provide positive distraction such as window views of nature, access to gardens, indoor plants, and nature photography, which may alleviate patient pain, stress and anxiety (National Institute of Building Sciences, 2013, p. 34).

An example of LDR design is the labor and delivery rooms in the UCSF Women's Specialty Hospital at Mission Bay (Figure 2.1). The rooms were designed to promote a calm birthing experience. At the same time, the environment is a functional one in which caregivers can efficiently perform their services. The Hospital provides a family area in each labor and delivery room to keep the family members comfortable during all stages of the childbirth process. Some of the facilities in the family area include a sofa, a wireless Internet connection, a refrigerator, and a media wall offering access to education, medical records, entertainment, environmental controls, and housekeeping and food services (Mission Bay Hospitals, 2013).



Figure 2.1. LDR at the UCSF Medical Center at Mission Bay (Mission Bay Hospitals, 2013).

Lighting

Appropriate lighting has many positive health outcomes such as reduced depression, decreased distress, and improved circadian sleep-wake cycles (Wallace-Guy et al., 2002; Altimier, 2004). Decreased exposure to sunlight and a total dependence on artificial light causes several negative health outcomes such as tiredness, illness, elevated blood pressure, depression, visual fatigue, headaches, cognitive disturbances, and suicide (Lieberman, 1992; Fouts & Gabay, 2008; Huelate, 2008; Altimier, 2004). Also, artificial light can affect patients' and staff's circadian rhythms, especially when they are exposed to it at night (Gooley, 2008). Ultraviolet light was one of the elements that helped improve the healing process by increasing protein metabolism, decreasing fatigue, stimulating white blood cell production,

increasing the release of endorphins, decreasing blood pressure, and generally promoting emotional wellbeing (Altimier, 2004, p.90). Exposure to sunlight is also associated with improvement in mood and sleep, as well as decreased use of pain medication and a potential reduction in the recovery time for some patients (Fouts & Gabay, 2008). For these reasons, plans to include natural light in healthcare settings should be considered early in the initial design process (Huelate, 2008). Moreover, these effects were found in patients with a specific type of depression, which indicates that sunlight is not necessarily beneficial to all patients (Dijkstra et al., 2006).

Lighting in the labor and delivery context was not established in literature, since labor process time is not predictable and could happen anytime. In general, providing sufficient lighting in the LDR is vital to achieving the best care possible. However, women seem to favor being in labor during the night. Mothers stay relaxed during quiet nights, which makes the labor quicker and less complicated. In contrast, the number of staff usually decreases during late shifts and the least experienced physicians work at nights (Rubenzer, 2008). According to Cassidy (2006), compared with babies who are delivered between 7.00 a.m. and 7.00 p.m., babies delivered late at night have a 16% higher chance of dying (as cited in Rubenzer, 2008, p.10).

Color

Use of color is a part of the healing environment design and its effect has been known since the ancient times. Research shows that color has an effect on individuals, including their pituitary and thyroid glands. Blue and green, for instance, have been shown to increase relaxation and balance (Fouts & Gabay, 2008). This effect occurred because the short wavelength in the blues and greens generally elicited more pleasure

than the longer wavelengths of yellow and red tones (Lankston, Cusack, Fremantle & Isles, 2010). Warm colors such as yellow and orange seem to encourage activities and energy (Fouts & Gabay, 2008). Since the effect of colors has been known and established, using colored light as treatment is a growing field of study for many acupuncturists. Ocular light therapy works by using light projected through a colored filter into the eyes. This type of therapy has been found to improve brain activity, energy, and intellectual capacity as well as mental, emotional, and physical wellbeing and performance (Schweitzer et al., 2004). Studies also suggested that colors may be one of the reasons why patients prefer paintings depicting nature scenes, since these are often dominated by blue and green (Lankston, Cusack, Fremantle & Isles, 2010). Specific colors in the spectrum affect emotion and physiologic responses, which make designers obligated to design with calming colors that promote rest (Altimier, 2004).

In LDR design, a study conducted by Duncan (2010) gathered information from pregnant women regarding their preferred choice of colors for a piece of artwork that will be displayed in a labor room. Two groups of color choices were highly preferred by the participants; the first one is earthy warm colors, such as reds and oranges, and the second one is cool colors related such as blues and greens.

Positive Distraction in Healthcare

The concept of healing environments suggests that the physical environment of healthcare can make a difference in how quickly the patient recovers from or adapts to severe and chronic conditions. Incorporating positive distractions, such as visual art, into the healthcare settings can help create these healing spaces (Dijkstra, Pieterse &

Pruyn, 2006). Positive distractions refer to certain types of environmental features that have been shown through research to successfully decrease stress and support wellness. Positive distractions also evoke positive feelings and hold attention without stressing the individual, which helps women/patients/people avoid thoughts of worry and discomfort (Ulrich, Simons, Losito, Fiorito, Miles, & Zelson, 1991).

Previous studies discuss a number of interventions, which could be used as positive distractions in hospital environments. These interventions include: music, audiovisual distractions, visual distractions, decoration, and aromas (Drahota, Ward, Mackenzie, Stores, Higgins, Gal & Dean, 2012). Positive distractions can also come in several forms such as a fireplace, artwork, game table, or even a window with an outside view. Healthcare providers and patients prefer windows with a view of a natural scene for its positive impact. Sternberg (2009) found that windows with an outside view to green spaces, such as gardens, have a calming effect and promote faster healing when compared to windows with no outside view or views of other buildings (as cited in Cesario, 2009). Having a window in the room, and adding a beautiful or interesting view was one of the factors that was emphasized by many women in Newburn's and Singh's study (2003). They also suggested that paintings, posters, or music could help the women take their mind off the pain during contractions.

Positive distraction and the LDR

The concept of incorporating positive distractions into one's experience to soothe pain was also implied by training programs for the labor and delivery process. For example, in the Lamaze classes or other treatment for childbirth preparation, the

mother was instructed to use a focal point as a type of stimulus to focus her attention and thus distract her from the feelings associated with labor (Stone, Demchik-Stone, & Horan, 1977 as cited in McCaul & Malott 1984, p. 517).

In addition, Hydrotherapy or relaxation in a bathtub or a pool was reported in research to be a beneficial strategy for decreasing muscle tension and increasing a mother's comfort. It was also associated with a decrease in pain level and higher satisfaction with the labor experience (Lowe, 1996).

Positive distraction during labor can also be visual. One example of incorporating visual positive distraction into the LDRs is Staricoff, Duncan and Wright's study (2003). The research team designed a portable screen with an abstract image inspired by colors and elements of nature. This screen was designed to be used in the LDRs as a focal point to distract from pain and to prevent any additional stress that can be caused by seeing medical equipment. The study final sample consisted of 32 women in the control condition, and 26 women in the experimental one. The study findings showed a decrease in labor length of 2.1 hours in the experimental group. In addition, the requests for the Epidural Anesthesia were 7% lower in the experimental group than the control group.

All of the above are considered positive distractions. In Newburn's and Singh's study, one woman said "the wall I was staring at got fairly boring; it would have been good to have things to look at on the walls" (2003, p. 21). Providing patients, families, and staff with access to nature by adding indoor and outdoor gardens, views of natural scenes through windows, and artwork of nature themes can reduce stress (Schweitzer et al., 2004). Patients with nature images in their

environment had less anxiety and required fewer medications to soothe pain (Ulrich, 1991). However, access to a nature view through windows is not always applicable in healthcare settings, especially in labor and delivery rooms. Some women will have limited ability to move because they are hooked to a fetal monitor or IV. This increases the need to incorporate other forms of nature, such as representative nature imagery. The literature also suggests incorporating a combination of guided imagery exercises with specific types of relaxing sounds or music (Lowe, 1996). Access to nature images in the LDR will assist such relaxation techniques.

“Pleasant imagery not only requires attention, but it also may enhance pleasant emotionality” McCaul & Malott, 1984, p.524). Based on that, the choices of visual art in healthcare environment should be considered carefully. Visual art displayed in patients’ areas should include positive themes and avoid ambiguous subjects. It also should give feelings of security or safety. Nature settings with trees, water and other nature content are suitable themes for such spaces (Ulrich, 1991). In addition, using personal photos of the mother's families can be a proper theme. One study examines the effect of personal photographs on three mothers and indicates that the mothers considered their parents and their children as positive entities and rated them the most pleasant pictures (Behrens, Bahm, & O'Boyle, 2011).

Another aspect of choosing the appropriate positive distraction is cultural diversity. According to Schweitzer et al. (2004) hospitals are challenged to meet religious needs for diverse populations. Nature may be the most universal theme to meet these differences in spiritual needs, which makes a number of hospitals add

gardens so patients can concentrate on spirituality. Moreover, nature can be also useful for providing lifecycle images such as birth and renewal of life.

As most of the healthcare settings trying to incorporate the best choices of art, sometimes, inappropriate types of art may be seen in such environments. For instance, abstract art or images that look violent, angry, and confusing could affect an individual's emotions negatively. For that reason, art should be carefully selected to be pleasant, friendly, and to encourage positive feelings (Huelate, 2008). Some art programs have been created to be used with patients and showed a positive effect such as Art a` la Carte program. This program enables long-term care patients to decorate their hospital rooms with art prints of their choice. Participants in this program suggested that the art they chose brought back memories from the past, therefore providing an appreciated distraction for patients, relieved their boredom and offered them a happy escape place for their minds (Suter & Baylin, 2007). Because these art prints bring out memories they become conversation pieces, helping to ease interactions with patients and family and stimulate discussions about things other than their medical routine (Suter & Baylin, 2007).

As another example of introducing art activities into healthcare users, Stuckey & Nobel (2010) found that engaging women with cancers in activities involving visual art helped them concentrate on positive life experiences and relieved their ongoing preoccupation with cancer. These activities also improved their self-worth and achievement and enabled them to express their feelings in a figurative manner (Stuckey & Nobel, 2010).

Previous studies showed that waiting can be soothed more effectively by improving the attractiveness of the waiting environment (Nanda, Chanaud, Nelson, Zhu, Bajema, & Jansen, 2011). A study by Pati and Nanda (2011) suggests that the use of positive distractions can affect the stress and anxiety associated with the waiting experience. Incorporating positive distractions into the labor room may have a similar impact by reducing stress associated with waiting, especially with the increase of labor hours.

Visual art can come in several forms and is not limited to paintings or posters. It can be displayed on a TV or DVD as well. A study by Cusack, Lankston and Isles (2010) was conducted to find out the factors of the Dumfries waiting area that were considered important to patients' experiences. The study revealed that patients rated paintings and TV as the same degree of importance. In the LDR content, Hodnett, Stremler, Weston and McKeever (2009) provided women in labor with the option of using projectors to show DVDs of movies of ocean beaches and mountain waterfalls on the wall. Twenty-five women (86.2%) reported they used the DVDs of nature movies.

Nature Scenes

Studies were conducted to investigate the effect of visual art that express nature imagery on the users of different healthcare settings, including waiting areas and patient rooms. Some of these studies combined nature imagery with sounds from nature. Other studies installed still and video nature scenes. Nanda, Chanaud, Nelson, Zhu, Bajema and Jansen (2011) conducted a study to analyze the effect of nature imagery (still and video) on patients' and visitors' behavior in Emergency Department

(ED) waiting rooms. The study design was a pre/post-intervention with an extensive art installation used as the intervention. All the people in the waiting room area were observed, regardless of whether they were patients or visitors accompanying family members (Nanda et al., 2011). The study found that providing positive distraction impacted patients' experiences by reducing anxiety and stress. This kind of distraction also helped in increasing socialization and decreasing "people-watching" which has a strong implication for privacy needs (Nanda et al., 2011). Environments enriched with nature can also maximize the effect of treatments and reduce the required healing time (Kayan, 2011).

Another type of study was conducted to investigate the effect of visual art combining the sounds from nature. According to Ulrich (2008), nature distractions may have a stronger impact on soothing pain if they involve sound as well as visual stimulation, and encourage a greater sense of engagement (Malenbaum, Keefe, Williams, Ulrich, & Somers, 2008). One of these studies was conducted to determine whether the use of nature sights and sounds during flexible bronchoscopy (FB) reduces anxiety, pain, and improves patient satisfaction with the procedure (Diette, Lechtzin, Haponik, Devrotes & Rubin, 2003). Murals of nature imagery were placed at the bedside, and patients were provided with a tape of nature sounds as well (*e.g.*, sounds of water or birds). The participants listened to the tape before, during, and after the procedure. Patients completed a survey with baseline information while waiting to begin the procedure and a follow-up survey was conducted on the second day following the procedure. The study findings showed that exposure to nature sights and sounds before, during, and after bronchoscopy is a safe, inexpensive way to

enhance analgesia, with none of the risks or side effects caused by medications.

Additionally, the positive distraction reduced the pain level, which decreased the doses request of analgesics or sedation during bronchoscopy (Diette et al., 2003).

Theories explain the impact of nature on humans

Several theories were developed to explain the impact of nature on individuals from different aspects such as environmental physiology, medical or clinical research, and landscape aesthetics. The attention restoration theory (ART), and stress reduction theory (SRT) are two theories explaining the effects of nature experience on cognitive function and mental health (Bratman, Hamilton, & Daily, 2012).

Stress reduction theory (SRT), suggests that there is a healing power of nature, which lies in the unconscious response to elements from nature. Exposure to nature can reduce stress through physiological responses that occur automatically without the person's recognition, especially for those who have been experiencing a high level of stress before the nature experience. Certain natural places may be viewed by the unconscious mind as safe places in which human beings used to have greater rates of survival (Bratman et al., 2012).

Ulrich suggested that landscapes with views of water and/or vegetation contain the most important and beneficial elements for human survival. According to SRT, these landscapes help to moderate and reduce human states of negative thoughts within minutes, through psycho-physiological pathways (Bratman et al., 2012).

The second explanatory theory is the Attention Restoration Theory (ART). It explains the power of nature to fill certain types of attention through unconscious cognitive processes in response to nature views. The theory claims that directed

attention is the mechanism most related to concentration and that urban life extracts this capability more consistently than situations humans had to deal with in the past. The experience of interacting with natural environments allows this capability to fill itself through a process of restoration (Bratman et al., 2012).

Another explanation suggests that conscious preferences for landscape aesthetics may relate to the restorative benefits of nature in a complicated manner. One study has shown that the more mentally fatigued the subject, the greater the likelihood that he or she would choose a restorative walk in a natural environment over an urban one (Bratman et al., 2012).

In laboratory research, Ulrich suggested that visual exposure to everyday nature led to significant recovery from stress within five minutes or less, as indicated by positive changes in physiological measures such as blood pressure and muscle tension (Ulrich, 1990). A large body of research also examined the effect of art inspired by nature on individuals in different settings such as learning and healthcare environments. For instance, environments enriched with nature can have a positive impact on patients that have brain injuries. It also serves as a distraction from pain, attracting the attention away from the pain or turning the concentration to other activities (Kayan, 2011).

Abstract art vs. Landscape art

Vartanian and Goel (2003) conducted a study to find out the effect of different types of art on the brain. The authors chose representational (including landscape paintings) and abstract paintings for their samples. They presented these paintings in

their original forms and manipulated forms to participants while being scanned by fMRI.

The study findings showed that activations in several areas of the brain, such as the right caudate nucleus, bilateral occipital gyri, and the cerebellum, were related to subjects' preference ratings in different ways. Specifically, activation in the right caudate nucleus reduced response to the least favorable paintings in the preference ratings. In contrast, activation in the bilateral occipital gyri and left cingulate sulcus increased response to the high preference ratings (Vartanian & Goel, 2003). Also, the result showed that representational art, including landscape paintings, were preferred over abstract paintings (Vartanian & Goel, 2003).

Ulrich conducted a preliminary study to investigate the effect of several styles and themes of wall art in psychiatric areas at a Swedish hospital. The unstructured interviews showed that patients had positive attitudes toward paintings inspired by nature content such as landscapes and still-lives. On the other hand, abstract paintings with ambiguous or unclear images evoked negative comments, and some patients found this type of art very disturbing (Ulrich, 1990).

Innovative Ideas in the LDR

Family-Centered and Homelike design

The healthcare environment is described by many patients as a frightening space, which increases the need to create a more welcoming and comfortable one (Fannin, 2003). There is increased awareness among hospital leaders' of the significant impact of healthcare environment on the quality of provided care. The healthcare

environment influences the way patients and their families respond and heal (Felgen, 2004). Healthcare settings that use family-friendly, patient-focused, and homelike designs retain the consistency between what the patient expects and what the patient really receives. Studies showed that creating friendly spaces that are comfortable and esthetically pleasing, are some of the aspects that influence consumers' evaluation of healthcare quality (Spitzer, 1988)

Patient-focused designs create maximum opportunities for family interaction and personalization of service. These types of designs are often used in children and women's care for their therapeutic effect, and to provide the expected level of comfort and satisfaction in children and women's acute care (Fottler, & Ford, 2000).). The 'homelike approach' is another concept associated with a family-centered environment. This approach is associated with a setting that has the comfort and surroundings similar to those found at home, which creates a less stressful environment (Fottler, & Ford, 2000). Healing environments, which provide comfortable, attractive settings and home-like surroundings, have been shown to be a therapeutic intervention and effective in the reduction of stress (Fouts, & Gabay, 2008). One of the solutions that many designers applied to achieve the home-like concept is hiding the medical equipment behind cabinets or screens.

In labor and delivery rooms, incorporating some elements of the homelike bedroom such as a rug, draperies, pictures, and a double bed are associated with the homelike concept (Fannin, 2003). Olsen (1984) compared a progressive-care unit (a less hospital-like environment) to a traditional unit. Patients in the progressive-care unit felt more positive and showed more social activity and mobility, and less passive

behavior (as cited in Dijkstra, Pieterse, & Pruyn, 2006). Additionally, a study examined the level of pain differences between two different environments--couples who chose delivering at home versus those who chose hospitals. Women who delivered in a hospital found the labor to be significantly more painful than those who delivered at home (Morse & Park, 1988).

Sutter Maternity and Surgery Center in Santa Cruz, CA, is an example of applying a homelike approach. The birthing suites were built with respect to design details such as window seats, French doors, custom-finished cabinetry, and private terraces. In addition, the suites host patients during labor, delivery, and postpartum recovery (Fottler, & Ford, 2000). The effect of the homelike concept in LDRs was addressed in literature. One study found that women who were allocated to birth center care that included midwifery care, limited use of medical technology, a homelike and small-scale environment, and encouragement of the woman and her partner's involvement in decision-making, were more satisfied with the care during labor than women allocated to standard maternity care (Waldenstrom, 1999). Also, personalizing labor rooms by adding personal photos is encouraged as part of incorporating a homelike concept (Fannin, 2003). Allowing women to choose the images displayed in the labor and delivery room could be part of childbirth preparation. According to Goodman et al. (2004), women who had childbirth preparation were more satisfied with the overall childbirth experience than those who did not have childbirth preparation.

As a part of the homelike environment, having supportive caregivers is a critical factor in women's satisfaction with their labor experience (Hung & Lee, 1997).

Some studies also suggest that women were more satisfied with the quality of care provided by midwives than that provided by physicians (Harvey, Rach, Stainton, Jarrell & Brant, 2002). This study recommends making the midwifery care option more widely accessible, especially for women in low risk pregnancies (Harvey, Rach, Stainton, Jarrell & Brant, 2002).

Biophilic design

Improving the indoor environmental quality enhances the patients, their families, and the staff's wellbeing. Finding ways to incorporate nature within design can be done by integrating natural materials, and including organic shapes such as curved walls and nature patterns (Huelate, 2008). In addition, adding some elements inspired by water is preferred. People are usually attracted to the sound of water for its calming effect and feeling of spiritual regeneration. For this reason, biophilic design has often used water as a focal point in healthcare facilities.

Biophilic designs have a powerful impact and are appreciated by patient, staff, and families. The challenge is to design environments using biophilic design features that satisfy people's love of nature, and support the healing process (Huelate, 2008). Access to supportive gardens in maternity units can be beneficial. According to Barnes & Marcus (1990), supportive gardens can be an important complement to the healing process and help improve overall quality of care. These gardens promote a sense of control and access to privacy and social support, and serve as a positive distraction. Moreover, finished materials and furnishings can introduce elements of nature and promote a healing environment. Wood creates interest and a cozy feeling and people respond positively to it. Real wood is most appreciated in areas that people touch, such

as hand railings, furniture, and wall details. Elements from trees, especially leaves, can be used as decorative motifs for floor, ceiling, and wall design (Huelate, 2008).

In the LDRs, researchers suggested incorporating water to the birth environment (England & Horowitz 1998; Lowe, 1996). England & Horowitz suggested to incorporate into the labor experience accessibility to any moving source of water, especially in the late stage of labor. A woman may do this by walking by a water fountain, a pool, or taking a bath.. Research has shown that it effectively facilitates dilatation and enhancing the labor experience. If direct access to a source of water is not available, England and Horowitz (1998) suggest practicing on water imagery during labor to achieve similar effects. In addition, imagining any form of changing or moving nature such as a blooming flower was recommended to facilitate baby delivery (England & Horowitz 1998).

New design concept to support women during childbirth.

Philips designed a program using smart phone applications and interactive animation to enhance women's experiences during labor and decrease stress levels by using this technology as a distraction. A study was conducted to examine its effect on supporting women during labor. The smart phone application was designed to assist women in practicing several labor breathing techniques before the delivery. The app also allows women to personalize the environment of the delivery room by creating an interactive visual animation (Figure 2.2). This animation grows and changes in response to the progress of the birth. It displays on the wall and switches to a breathing coach when a contraction occurs. This application helps the mother to experience

more control and support by visualizing their progress. Finally, the Ambient Experience concept transforms the delivery room into a more personalized environment for the woman and her partner (Philips, 2013).

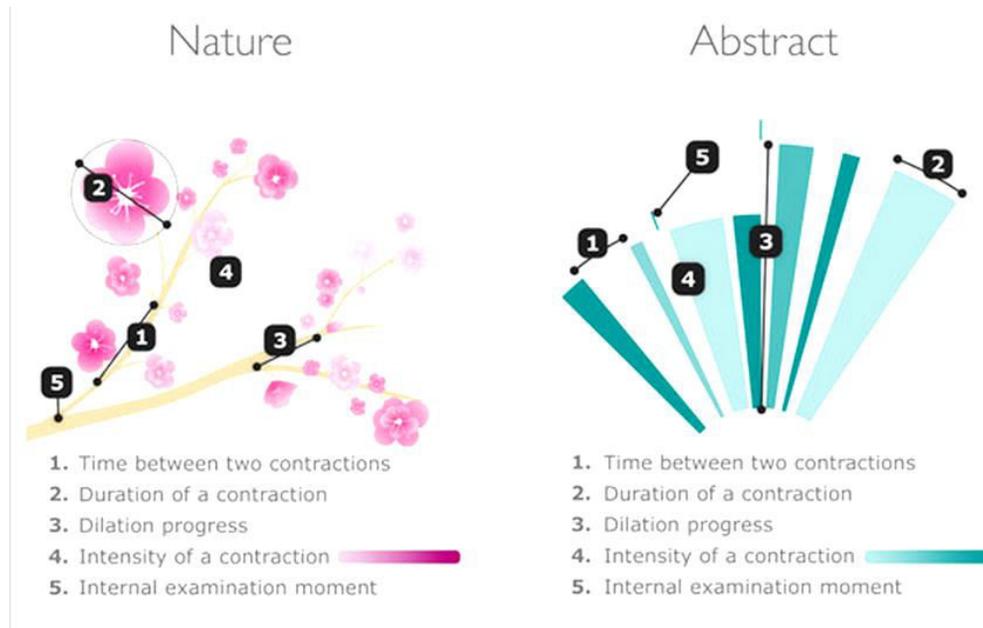


Figure 2.2. Two different themes – nature and abstract – that women can choose using the smart phone app (Philips, 2013).

Summary

In general, a woman's satisfaction with her childbirth experience could have a long-term impact on her wellbeing and her relationship with her baby (Goodman et al., 2004). Literature suggests several factors are related to satisfaction with childbirth, including: difficulty of delivery, medical intervention, use of pain relief, and women's participation in and control over the birth process (Green et al., 1990). If women effectively manage their childbirth pain, they may evaluate themselves more satisfactorily than they evaluate the total experience. Therefore, measuring only total childbirth satisfaction may give an incomplete reflection of women's satisfaction with

the childbirth experience (Goodman et al., 2004). Another factor associated with the labor experience is a woman's expectations during pregnancy. Studies found that expectations during pregnancy are associated with the experience of the same aspect while giving birth. For instance, positive emotional expectations in labor are associated with experiencing positive emotions in labor (Ayers & Pickering, 2005). The focus in designing healthcare facilities is changing from an emphasis on the functional delivery of care towards healing environments that are also psychologically supportive (Dijkstra, Pieterse, & Pruyn, 2006). Creating supportive healthcare environments can be done by fostering control through privacy, promoting social support, and providing access to nature and other positive distractions (Ulrich, 2000). Also, incorporating natural light, noise control, appropriate temperature, and attractive interiors and decor can improve the customer's experience (Fottler, & Ford, 2000). Some hospitals incorporate healthcare and hospitality services by providing the convenience level of a hotel stay (Fottler, & Ford, 2000).

Integrating these elements of design would help to reduce financial costs. For example, hospitals saved 30,000 to 50,000 dollars a year when they added room service. The third meal in hospitals was rejected and wasted when patients were not happy with it. A healing environment can be designed to meet customer's needs for experienced care, physical and psychological comfort. Moreover, healthcare organizations should create environments that encourage repeat visits to increase profit (Fottler, & Ford, 2000). Finally, one study mentioned that women have clear preferences about the type of environment, facilities and control they want in order to have maximum comfort and support during labor. However, there is a significant gap

between the facilities women would like and what is available (Newburn & Singh, 2003).

CHAPTER III

METHOD

Research Design

The study adopted a quantitative, experimental approach in a field setting, involving two comparison groups. It compared women's experiences of labor while in the presence of nature images with those who were not exposed to nature images.

Specific Aim

The specific aim of this study is to examine the impact of visual nature stimuli on women during labor and delivery. The study hypothesized that introducing nature-based images in labor and delivery rooms may have a positive impact on women's satisfaction with the labor experience.

Variables of Interest

Demographic Information - The first section reports data detailing the demographic information of the participants including ethnicity, gender, age, education, and marital status.

The independent variable is the presence or absence of a representational nature view.

The dependent variable is women's labor experience, which is operationalized through multiple measurement dimensions.

Definition of Terms

Labor experience

Conceptual. The experience of labor and birth is defined as "an individual life event, incorporating interrelated subjective psychological and physiological processes, influenced by social, environmental, organizational and policy contexts" (Larkin, Begley & Devane, 2009, p. 49).

Operational. For this study 'labor experience' was operationalized as the subject's scores on five measures: (1) labor duration, (2) pain relief usage, (3) Apgar scale for the infant, (4) vital signs, and (5) scores on a sub-scale from the Quality from Patients' Perspective (QPP) questionnaire.

Labor:

According to Cheng and Caughey (2014) "Labor is a physiologic process during which the products of conception (i.e., the fetus, membranes, umbilical cord, and placenta) are expelled outside of the uterus. Labor is achieved with changes in the biochemical connective tissue and with gradual effacement and dilatation of the uterine cervix as a result of rhythmic uterine contractions of sufficient frequency, intensity, and duration". The "active stage" of labor among healthy, low-risk women was an average of 6.0 hours, and the average linear rate of cervical dilation during this period was 1.2 cm per hour (Neal, Lowe, Ahijevych, Patrick, Cabbage & Corwin, 2010, p. 216).

Operational. Labor duration was defined as the time period entered on hospital medical records for each subject.

Epidural anesthesia.

Conceptual: According to the American Pregnancy Association, Epidural anesthesia is regional anesthesia that blocks pain in a particular region of the body. Epidurals block the nerve impulses from the lower spinal segments, which results in reduced feelings in the lower half of the body. Epidural medications fall into a class of drugs called local anesthetics, such as bupivacaine, chlorprocaine, or lidocaine (2007).

Operational: Pain relief usage was defined as the frequency of Epidural and other pain medication administration entered on hospital medical records for each subject. The pain medications including Epidural anesthesia were recorded and used in the data analysis to find out if the pain medication requests were lower in the experimental group.

Apgar score.

Conceptual: According to University of Maryland Medical Center, the Apgar score is a screening test used for fast assessment of the infant health. This assessment is carried out one minute and five minutes after birth (2013). It measures five characteristics: heart rate, respiratory effort, muscle tone, reflex irritability, and color. The assigned value ranges from 0 to 2 and the total score is the sum of the five components. If the score is 7 or higher, it indicates that the baby's condition is good to excellent (Casey, McIntire & Leveno, 2001, p.467).

Operational: Apgar score was defined as the score entered on hospital medical records for each subject. The total Apgar score is used as one of the indicators for whether the labor experience is a positive or negative one.

Vital signs.

Conceptual: “Vital signs are measurements of the body's most basic functions. The four main vital signs routinely monitored by medical professionals and health care providers include the body temperature, pulse rate, respiration rate (rate of breathing), and blood pressure (Blood pressure is not considered a vital sign, but is often measured along with the vital signs)” (Johns Hopkins Medicine, para. 1, 2014).

Operational: Vital signs were defined as the respective numbers entered on hospital medical records for each subject. The vital signs in the study refer to measurements of the heart rate and blood pressure. These measurements are recorded every approximate hour (Appendix F).

Caesarian section (C-section).

“C-section is a surgical procedure used to deliver a baby through an incision in the mother's abdomen and a second incision in the mother's uterus” (Mayo Clinic, 2012, para.1)

Control.

"Control often used in the sense of control over what is being done to one, is associated with a more positive birth experience, increased satisfaction, and less depression"(Green et al., 1990, p.16).

Communication.

Nurse-patient communication in healthcare settings is defined as a target professional communication between nurse and patient during treatment (Vuković. et al., 2010. p).

Satisfaction with the Quality of Care.

According to Spitzer (1988, p. 32), consumers define “quality of care” as “a result of their perceptions of factors important to their physical and psychological comfort”.

Quality from Patients' Perspective (QPP) questionnaire.

The QPP-questionnaire was designed to measure the quality of care from the patient’s perspective. The questionnaire was developed using a grounded theory approach and consists of 56 items (Wilde, Garry, Larsson & Starrin, 1993). Twenty items from the scale were chosen to examine women’s experiences of labor with a 5-point Likert scale: 1) Do Not Agree at all, 2) Do not agree, 3) Neutral, 4) Agree, 5) Fully agree.

Biophilia.

The expression “biophilia” was created by Dr. Edward Wilson (Kellert S, Wilson, 1993, p 11), and means “the innately emotional affiliation of human beings to other living organisms” (p.31).

Positive distraction.

“Any strategy whose purpose is to block awareness of the painful stimulus or its effects will be considered a distraction strategy” (McCaul & Malott, 1984, p. 517). A positive distraction can be also defined as “an environmental feature or element that elicits positive feelings, hold attention and interest without taxing or stressing the

individual, and therefore may block or reduce worrisome thoughts” (Ulrich, 1981; Ulrich, 1991, p. 102).

Subjects:

The sample consists of 60 women in labor. The participants were recruited by members of the study team during prenatal classes offered at the Texas Tech University Medical Center (UMC) Birth Center in Lubbock and from Health Point Clinic in the same city. The sample was divided into two groups through the method of randomly selecting envelopes at the front desk. When each participant arrived to deliver her baby, one of the study members pulled an envelope to assign her to one of the study rooms. Group A was the control group with no nature images on display. Group B had nature images displayed on an additional TV in the labor and delivery room. Each subject's age, education, previous childbirth experiences, and other demographic data were recorded through a personal data questionnaire.

Inclusion Criteria

The sample was recruited from prenatal classes offered at the Texas Tech University Medical Center (UMC) Birth Center in Lubbock and from Health Point Clinic in the same city, and comprised women with plans to deliver at UMC. The participants were 18 years of age or older, and they understood English. Women who had one previous C-section and planned to do Vaginal Birth After Cesarean (VBAC) were also included in the study.

Exclusion Criteria

Patients younger than 18 years or unable to speak or write in English were excluded from the study. Also, the study excluded those who scheduled to have a C-section, those for whom a C-section was likely, and those who had previously had multiple C-sections. Women with a known history of preterm labor or currently known fetal anomalies, or who were deemed by the principle investigator to be in any way at higher risk were also excluded.

Approval of the research project was obtained from the Texas Tech University Health Sciences Center Protection of Human Subjects Committee. Patients provided written informed consent for their participation in the study (Appendix B).

Research Setting

The research site was the UMC Family Birth Center. According to their website, this new facility is trying to incorporate natural techniques such as walking during labor, aromatherapy, massage, and music (2013). Such a vision of hospital care was a good fit for this study since it aims to incorporate natural, relaxing techniques.

The UMC Family Birth Center and neonatal intensive care unit are located on the first two floors of a four-story building. The total occupied space is around 91square feet (Figure 3.1). Each Birth Center room is equipped with a rocking chair, foldout couch, patient bed, computer and monitor for charting, TV, and walk-in shower. The center includes 45 recovery rooms, 17 delivery suites, three surgical suites, 10 maternal/fetal suites, and 34 postpartum rooms.

Four Labor and Delivery rooms were used for the control group; four additional rooms were used for the experimental group (Figure 3.1). TV screens with USB ports were installed in the experiment Labor and Delivery (LDR) to display nature images (Figure 3.2).



Figure 3.1. Labor and Delivery suites in East Tower at UMC (UMC Family Birth Center, 2014).

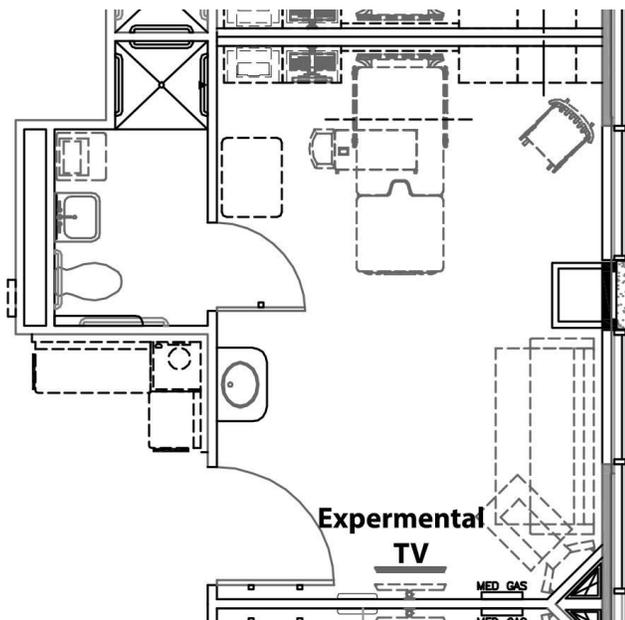


Figure 3.2. The experimental TV at the LDR at the UMC Birth Center (UMC Family Birth Center, 2014).



Figure 3.3. The LDR at the UMC Birth Center (UMC Family Birth Center, 2014).

Interventions

The study sample consisted of two groups of participants.

Group A was the control group. Women in Group A were able to watch regular TV at their discretion, but there were no nature images displayed. The sample for Group A consisted of 26 women.

For Group B (N=24), in addition to the regular TV, another TV displayed nature images. The size of both TVs was 32 inch wide. The images were chosen according to recommendations in the literature; namely, that “the images represent natural settings with trees, flowers, water and other nature content, and should have unambiguously positive subjects that suggest security and safety” (Ulrich, 1991, p.). The photo credit for the images selected belongs to Henry Domke Fine Art (Appendix H). These images, which covered the whole screen, were downloaded on a USB flash drive as a looped video to be displayed during the entire period of labor. To increase perceptions of control in this group, each woman had a remote control for the TV to browse the

images. Otherwise, the images flipped automatically every 30 seconds. In total, there were 59 images (Figure 3.4, Figure 3.5). In order to record how many hours the patients watched TV images, a device to track the watching time was plugged into the experimental TV.



Figure 3.4. Example of the displayed nature images in the experimental TV (Image credit: Henry Domke Fine Art, 2014).

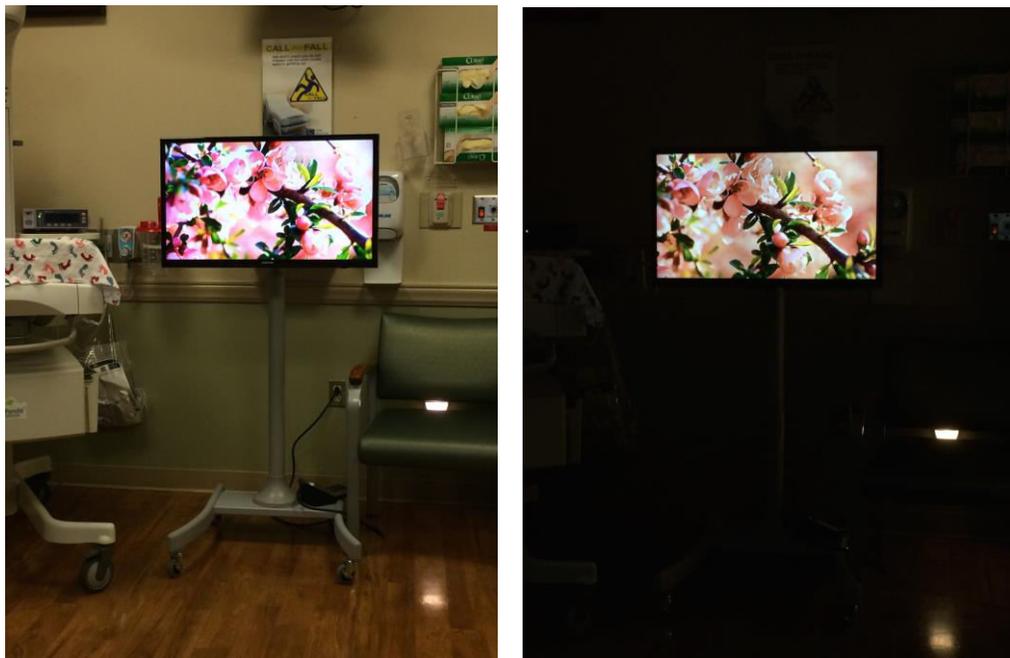


Figure 3.5. The experimental TV setup in the LDR, UMC Family Birth Center

Instrument

Labor experience

Labor experience was measured through the following indicators:

Medical records were reviewed after birth for labor and delivery data. One of the pieces of recorded data is the Apgar score, which is the first test given to a newborn in the delivery or birthing room right after the baby's birth. Five characteristics are assessed and assigned a value of 0 to 2: heart rate, respiratory effort, muscle tone, reflex irritability, and color. The total score is the sum of the five components and a score of 7 or higher indicates that the baby's condition is good to excellent (Casey, McIntire & Leveno, 2001). In addition, changes in the mothers' vital signs taken as part of standard care, including blood pressure and heart rate, were recorded. The study only recorded vital signs every hour, as the literature recommended to measure vital signs every 2 hours during late phases of labor and every hour during the active phase of the first stage of labor (Maternal care, 2012). Labor duration and the usage of pain medication, such as Epidural Anesthesia, was recorded. Also a sub-scale questionnaire, adapted from the QPP-questionnaire (Wilde et al., 1993), was administered to the mothers and collected before they were discharged from the hospital to measure satisfaction with the provided quality of care during their labor experience.

Developing the sub-scale:

The sub-scale items were adapted from the QPP-questionnaire (Table 3.1), which was designed to measure quality of care from the patient's perspective (Wilde et al., 1993).

According to this model, several dimensions are associated with the patient's view of quality of care. These dimensions are based on "person-related quality, and physical and administrative environmental qualities" (Wilde at al., 1993, p. 40). The chosen items for the sub-scale are taken from the following QPP-questionnaire categories:

Identity-oriented approach

- Being personal
- Interest in psychological situation
- Sympathy
- Interest of view-of-life
- Trust and understanding

Socio-cultural atmosphere

- Positive treatment of significant others
- Meaningful occupation/ personal belongings
- General atmosphere and home-like environment (Wilde at al., 1993, p. 42).

Table 3.1. Sub-scale items were adapted from QPP (Wilde at al., 1993).

Item	1 Do not agree at all	2 Do not agree	3 Neutra l	4 Agree	5 Fully agre e
1- The feeling that I have been taken seriously and treated with respect by the doctors 2- The feeling that I was treated in a positive manner by the doctors 3- The feeling that the nurses and the assistant nurses were personal in their contact with me 4- The feeling that the doctors were personal in their contact with me 5- The feeling that the nurses and the assistant nurses were interested in my experiences (e.g. desire, needs, uplifts, concerns, and hassles) 6- The feeling that doctors were interested in my experiences (e.g. desire, needs, uplifts, concerns, and hassles) 7- The feeling that the doctors showed sympathy when I was suffering (e.g. from anxiety or pain, etc) 8- The feeling that the nurses and the assistant nurses showed sympathy when I was suffering (e.g. from anxiety or pain, etc) 9- The feeling that the doctors showed interest in my outlook on life (my spiritual needs) 10- The feeling that the nurses and the assistant nurses showed interest in my outlook on life (my spiritual needs) 11- The help I wanted/needed to worship according to faith 12- The feeling that I can trust the doctors and that I received honest and sincere answers to my questions 13- The feeling that the nurses and the assistant nurses fully understand my situation 14- The feeling that I can trust the nurses and the assistant nurses that I received honest and sincere answers to my questions 15- The feeling that the doctors truly understand my situation 16- The feeling that my family and friend were treated in a positive manner by the doctors 17- The feeling that my family and friend were treated in a positive manner by the nurses and the assistant nurses 18- Access to a form of meaningful recreation during the care period 19- Experience a friendly atmosphere on the ward-which included positive treatment of my fellow-patients as well as between the staff members themselves 20- Access to a pleasant physical environment rather than a cold and sterile one					

Measuring reliability and validity

Internal Consistency Reliability

Internal consistency reliability for the sub-scale was supported by Cronbach's alphas. According to Nunnally (1978), a score of 0.7 is an acceptable reliability coefficient (Santos, 1999). The following table illustrates the Cronbach's alphas that Wilde et al. (1993, p.46) recorded for the long and short forms of the QPP (Table 3.3).

Table 3.2. Cronbach's alphas for the long and short forms of the QPP (Wilde et al., 1993, p.46)

Dimensions and factors	Chronbach alpha Long form	Chronbach alpha Short form
<i>Identity-oriented approach</i>	0.87	0.76
Being personal	0.80	0.71
Interest in psychological situation	0.95	This item was not included in the short form
Sympathy	0.92	This item was not included in the short form
Interest of view-of-life	0.89	0.89
Trust and understanding	0.81	0.66
<i>Socio-cultural atmosphere</i>	0.83	0.82
Positive treatment of significant others	0.92	This item was not included in the short form
Meaningful occupation/ personal belongings	0.43	0.52
General atmosphere and home-like	0.64	0.67

Validity

Construct Validity

In general, the literature suggests several factors are related to satisfaction with labor, including difficult delivery, medical intervention, use of pain relief, women's participation in decision-making, and control during the birth process (Green et al., 1990). The following section covers the factors addressed in the sub-scale questionnaire that are associated with the satisfaction of labor experience in the literature (Table 3.4).

Communication

According to Schwarzmann, Mease and Tollefson (2010), communication between caregivers in labor and delivery rooms is a crucial issue affecting patient safety. Mothers and babies suffer when there are issues with communication. A study conducted by Green et al. (1990) found that providing information was important at every phase of labor. Women who were able to discuss matters with staff and continued to be informed and updated were more satisfied with the labor experience and evaluated their childbirth as a positive experience (Green et al., 1990). In addition, women were significantly more satisfied with childbirth experience when they felt that they were engaged in nonemergency decision-making (Hart & Foster, 1996).

Social Support during labor

Social support may involve different strategies, ranging from support from one's family members, support from other patients, and support from caregivers.

Women who had positive childbirth experiences emphasized the psychological and physical benefits of having caring people with them (Butani & Hodnett, 1980).

Educational preparation

Educational preparation was related to a positive childbirth experience in some studies (Doering, Entwisle & Quinlan, 1980 as cited in Mackey, 1998). In contrast, other researchers found these classes are not related to birth experience satisfaction (Mackey, 1998). For that reason, the current study did not exclude any women due to their educational preparation.

Other factors affecting the labor experience are illustrated in the following section.

Control

Losing control over the women's own body or the environment was associated with less satisfaction, less of a positive experience, and low postnatal emotional well-being (Green, Coupland & Kitzinger, 1990). There are several environmental aspects that affect control during labor such as routines of hospital setting, caregivers' attentiveness, oxytocin induction, the fetal monitor, and the setting's physical design (Hodnett, 1982). Research also discussed other factors that affect self-control during labor, such as attending childbirth education classes (Hart & Foster, 1996), labor duration, self-esteem, social support, and educational background (Butani & Hodnett, 1993).

In this dissertation, the sub-scale measures factors impacting control, including social support, caregiver's attitudes, and open communication with caregivers. In addition, the labor duration, the usage of Epidural anesthesia, and the educational

background were recorded as a part of women's sense of control and overall labor experience indicators.

Type of birth

Another factor associated with the labor experience is the type of childbirth. Women who had vaginal births were more satisfied with the birth experience than those who had caesarian sections (C-section) (Hart & Foster, 1996). Based on this information, the present study excluded women who were scheduled to have a C-section, who were likely to have a C-section, or who already had multiple C-sections.

Labor duration

Women who had long or difficult labors were less likely to feel in control and had less positive psychological outcomes (Green, Coupland, & Kitzinger, 1990). The labor duration was recorded and used in the data analysis (Appendix E).

The usage of pain medications

Pain and loss of control are most frequently named as characteristics of unpleasant childbirth experience (Hodnett, 1980). The Epidural requests were also recorded and used in the study analysis (Appendix E).

Table 3.4. Study Variables.

Independent Variable	Tools/ Instruments	Source
Nature imagery	Categorical	
Dependent Variable	Tools/ Instruments	Source
Labor Experiment	Sub-scale retrieved from QPP questionnaire	
Apgar Scale	Medical records	UMC
Vital signs	Medical records	UMC
Labor duration	Medical records	UMC
Pain medication	Medical records: Epidural request	UMC

Procedures

When participants signed the consent form, they were given a participation card to hand in when they arrived at the hospital. Then, they were randomly assigned to the study groups. Two questionnaires were given to all participants after birth. The first questionnaire was a sub-scale adapted from the *Quality from Patients' Perspective* (QPP) questionnaire (Appendix C). The second questionnaire was a demographic questionnaire to record each participant's age, level of education, ethnicity, and number of previous childbirths (Appendix C). Both questionnaires were added to the charge file. Participants could answer them anytime before they were discharged, and after completion, they returned the questionnaires to the nurses. Subjects were provided with a study ID on the questionnaires so that their responses could be linked with the data. The following data was retrieved from the medical records after the delivery: changes of the mother's vital signs (i.e., blood pressure and heart rate), emergency intervention, Apgar scores, labor duration, and usage of Epidural

anesthesia. The vital signs were recorded from those taken according to standard of care procedure.

Analysis

III. Data Analysis

The study used a T-test to examine the difference between the mean QPP scores for the control group and the experimental group. Also, an ANOVA was run to examine the impact of the time spent watching Nature TV on the QPP scores. In addition, Pearson's Correlation was conducted to examine the relationship between the study variables: QPP scores, Apgar scores, women's vital signs, labor duration, and pain medications. In addition, each item of the questionnaire was analyzed using a T-test to find out if there was a statistically significant difference between the two group's scores. Based on the differences between group means on the variables of interest, the findings showed if the participants' birth experiences are improved or not.

CHAPTER IV

RESULTS

A total sample size of 60 was obtained at the conclusion of data collection. However, due to several factors, 10 participants were excluded from the study. One participant withdrew and planned for home delivery. Four participants (n=4) scheduled for C-section were excluded. The childbirth of three participants (n=3) had not been reported to the researcher during the delivery, which rendered them unqualified for randomization. Three participants who delivered in less than three hours (n=3) were excluded, since the average labor takes 12 to 18 hours in a woman's first pregnancy and 6 to 8 hours in subsequent pregnancies (Brown, 2013). Five participants (n=5) did not return the questionnaires, however, their medical record data was used in analysis. The study variables were examined for (N=50) participants and used in the data analysis, n=26 in the control condition, and n=24 in the experimental one. These analyses, including the study questionnaires and the physiological indicators, are presented in the following section.

Demographic questionnaire analysis.

The demographic questionnaire consisted of 8 items asking participants about the following:

1- Mother's cultural background.

The cultural backgrounds of the participants were the following: 52.2 % of the participants were Caucasian, 32.6 % Hispanic, 8.7% African American, 4.3% Asian, and 2.2% others.

2- Father's cultural background.

Regarding fathers, the cultural background was divided as the following: 39.1 % of the fathers were Caucasian, 47.8. % Hispanic, 6.5 % African American, 2.2 % Asian, and 4.3% others.

3- Participants' age.

The participants' age was divided into groups: 65.1% of the participants were in age 20 to 29 (n=28), 23.3% age were between 30 to 39 years (n= 10), 9.3 % under 20 (n=4), and 2.3% of the participants were 40 to 49 (n=1).

4- Educational background.

The level of education varied between the participants; 4.4 % completed some high school (n=2), 24.4% completed high school or equivalent (n=11), 13.3 % received post- high school training (n=6), 35.6 % completed college or university (n=16), 20 % completed some post-college (n= 9), and 2.2 completed graduate school (n=1).

5- Marital status.

The questionnaire showed that 73.3 % of the participants were married (n= 33), 2.2 % divorced (n= 1), and 24.4 % were singles (n= 11).

6- Previous childbirth.

For 47.8 % of the participants (n=22) it was their first experience of childbirth, and for 52.2 % of participants it was not their first childbirth experience (n=24); 21.7 % of the participants had one previous childbirth (n=10), 17.4 % had two previous

childbirths (n=8), 6.5 % of the participants had three previous childbirths (n=3), and 6.5 % had more than four previous childbirths (n= 3).

7- Employment status.

For employment status, 59.1 % of participants were employed (n=26) and 40.9 % of the participants were not (n=18).

In addition, there were two questions asking participants whether they watched nature images TV and how long they watched it. These two questions are analyzed in the following section to explain their relationship to the QPP scores.

Table 4. 1. Summary statistics of the demographic data

Demographic question	Category	Control group (n)	Experimental group (n)
1- Mother's cultural background	Caucasian	12	11
	Hispanic	6	8
	Asian	0	1
	African American	3	0
	Other	0	1
2- Father's cultural background	Caucasian	8	8
	Hispanic	10	11
	Asian	0	1
	African American	2	0
	Other	1	1
3- Participants' age.	Under 18	1	3
	20 - 29	13	13
	30 - 39	7	4
	40 - 49	0	1
4- Educational background	Some High School	0	2
	Completed High School or equivalent	6	4
	Post High School training	4	1
	Completed College/University	6	9
	Some Post College	5	4
	Completed Graduate School	0	1
5- Marital status.	Married	15	16
	Divorced	0	1
	Single	6	4
6- Previous childbirth.	First childbirth	9	13
	1 previous childbirth	3	6
	2 previous childbirth	5	1
	3 previous childbirth	2	0
	More than 4 childbirth	2	1
7- Family members with the participant	None	0	1
	1	8	9
	2	9	7
	3	3	1
	more than 4	0	3
3- Employment status.	Employed	9	15
	Not employed	11	6

QPP sub-scale

A power analysis was conducted to determine the sample size needed for a significant result. It was determined that a sample size of approximately 102 participants per group was needed to detect a significant difference between mean QPP scores for the

two groups. In the literature, one study examined the impact of visual stimulus in the LDR. It compared 26 mothers who were exposed to a visual stimulus during labor to 32 mothers in the control condition. The study findings were significant regarding labor duration, but not significant for the Epidural requests (Staricoff et al, 2003).

In this study, 42 questionnaires were used in the QPP analyses, and the rest of the questionnaires were excluded due to several factors that will be explained in the data limitations section.

Internal Consistency Reliability.

In order to measure the internal consistency reliability, Cronbach's alpha was calculated. The results showed a score of 0.93 for overall sub-scale reliability coefficient, and 0.9 for individual items, which is similar to the scores Wilde's et al. (1993) found for the original QPP scale.

Table 4.2. Overall Cronbach's Alpha score for the QPP sub-scale

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Number of Items
.933	.945	20

Table 4.3. Cronbach's Alpha for individual items.

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item1	87.88	85.260	.672	.933
Item2	87.76	85.639	.772	.933
Item3	87.90	85.590	.454	.938
Item4	88.12	80.110	.695	.933
Item5	87.76	85.739	.761	.933
Item6	87.90	82.440	.736	.932
Item7	87.95	83.148	.673	.933
Item8	87.73	87.951	.610	.935
Item9	88.20	79.061	.723	.933
Item10	88.17	81.295	.668	.934
Item11	88.39	86.744	.328	.941
Item12	87.78	86.476	.661	.934
Item13	87.73	86.251	.823	.933
Item14	87.71	87.312	.724	.934
Item15	87.88	83.860	.750	.932
Item16	87.85	83.528	.789	.931
Item17	87.73	87.251	.698	.934
Item18	88.37	82.638	.523	.938
Item19	87.90	84.590	.725	.933
Item20	87.95	82.998	.719	.932

Items 3, 11, and 18 of the QPP sub-scale have low reliability. The low reliability for these items is due to some missing values for these items.

QPP sub-scale results.

The study questionnaires were returned by 45 participants. However, three questionnaires were excluded because the length of their labor in the LDR units was less than three hours. A T-test was conducted to compare the QPP scores' mean for the control group and the experimental one (control group $n=21$, experimental group $n=21$). The result showed a slight increase of the experimental group QPP score mean (control group $m=4.46$, experimental group $m=4.63$). However, this increase was not significant. Also, women who had previous childbirth had a higher QPP mean score compared to the first-time mothers.

Table 4.4. QPP mean scores for participant who had previous childbirth vs. first childbirth.

	First Child Birth	N	Mean	Std. Deviation	Std. Error Mean
MEAN QPP score	Yes	22	4.4523	.53884	.11488
	No	19	4.6556	.44222	.10145

In addition, a T-test was run for each item of the questionnaire individually and the results are shown in the following table (Table 4.4).

Table 4.5. QPP mean scores for individual items.

Item	Control Group mean	Experimental mean
1. The feeling that I have been taken seriously and treated with respect by the doctors	4.43	4.81
2. The feeling that I was treated in a positive manner by the doctors	4.57	4.86
3. The feeling that the nurses and the assistant nurses were personal in their contact with me	4.60	4.62
4. The feeling that the doctors were personal in their contact with me	4.29	4.48
5. The feeling that the nurses and the assistant nurses were interested in my experiences (e.g. desire, needs, uplifts, concerns, and hassles)	4.67	4.81
6. The feeling that doctors were interested in my experiences (e.g. desire, needs, uplifts, concerns, and hassles)	4.43	4.67
7. The feeling that the doctors showed sympathy when I was suffering (e.g. from anxiety or pain, etc.)	4.24	4.76
8. The feeling that the nurses and the assistant nurses showed sympathy when I was suffering (e.g. from anxiety or pain, etc.)	4.76	4.81
9. The feeling that the doctors showed interest in my outlook on life (my spiritual needs)	4.10	4.43
10. The feeling that the nurses and the assistant nurses showed interest in my outlook on life (my spiritual needs)	4.33	4.24
11. The help I wanted/needed to worship according to faith	3.95	4.24
12. The feeling that I can trust the doctors and that I received honest and sincere answers to my questions	4.67	4.76
13. The feeling that the nurses and the assistant nurses fully understand my situation	4.75	4.86
14. The feeling that I can trust the nurses and the assistant nurses that I received honest and sincere answers to my questions	4.76	4.76
15. The feeling that the doctors truly understand my situation	4.55	4.67
16. The feeling that my family and friend were treated in a positive manner by the doctors	4.52	4.76
17. The feeling that my family and friend were treated in a positive manner by the nurses and the assistant nurses	4.76	4.76
18. Access to a form of meaningful recreation during the care period	4.00	4.19
19. Experience a friendly atmosphere on the ward-which included positive treatment of my fellow-patients as well as between the staff members themselves	4.57	4.67
20. Access to a pleasant physical environment rather than a cold and sterile one	4.48	4.62

The effect-size of the QPP was calculated by using the means and standard deviations of the two groups. The findings reported Cohen's $d = -.4$, and effect-size $r = -.2$, which indicated a small effect.

The individual items analyses indicated items 1, 2, and 7 were significantly different between the two groups. The following three tables (Table 4.6, Table 4.7 & Table 4.8) illustrated the statistical analysis for items 1, 2 and 7.

Table 4.6. T-test results for Item 1 on the QPP sub-scale (the feeling that I have been taken seriously and treated with respect by the doctors).

Item1. The feeling that I have been taken seriously and treated with respect by the doctors		Levene's Test for Equality of Variances		T-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Equal variances not assumed	6.737	.013	2.059	37.253	.047	-.381	.185	-.756	-.006	

Table 4.7. T-test results for Item 2 on the QPP sub-scale ‘The feeling that I was treated in a positive manner by the doctors’.

Item 2. The feelings that I was treated in a positive manners by the doctors		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Equal variances not assumed	7.540	.009	-1.581	36.000	.123	-.286	.181	-.652	.081	

Table 4.8. T-test results for Item 7 on the QPP sub-scale (the feeling that the doctors showed sympathy when I was suffering (e.g. from anxiety or pain, etc.)).

Item7. The feeling that the doctors showed sympathy when I was suffering (e.g. from anxiety or pain, etc.)		Levene's Test for Equality of Variances		T-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Equal variances not assumed	11.532	.002	-2.043	29.949	.050	-.524	.256	-1.048	.000	

In addition, the ANOVA analysis showed that an increase in the time spent watching Nature imagery is associated with an increase in the QPP scores. However, this correlation was not significantly different. The mean scores of the four categories were the following (Table 4.9, Table 4.10 & Figure 4.1).

Table 4.9. ANOVA results of QPP mean scores and the time spent watching nature images.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.446	3	.149	.585	.628
Within Groups	9.656	38	.254		
Total	10.102	41			

Table 4.10. QPP mean scores based on the nature images watching time.

Group	Control Group	Less 1 than hour	1 hour -3 hours	More than 3 hours
QPP mean scores	4.46	4.54	4.65	4.73

Moreover, the effect-size of the QPP was calculated by using the means and standard deviations of the control group and the participants who watched the Nature imagery TV more than 3 hours. The findings showed Cohen's $d = .61$, and effect-size $r = .30$, which indicated a small effect.

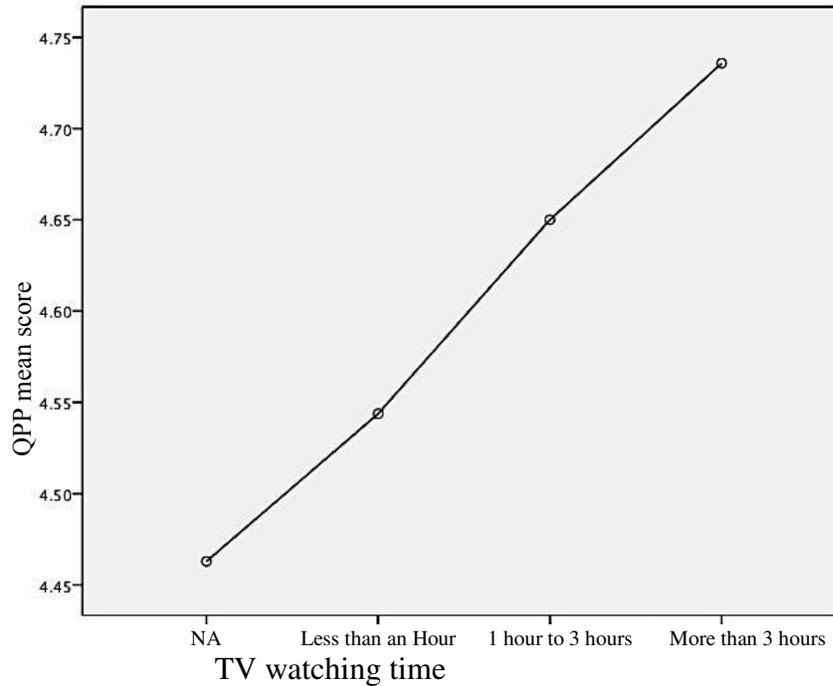


Figure 4.1. QPP mean scores and the watching time hours.

Watching Time results.

The following table (Table 4.11) shows a comparison between the TV recorded time from the TV time tracker and the watching time recorded by the participants on the questionnaire.

Table 4.11. Comparison between the TV recorded time from the TV time tracker and the watching time recorded by the participants.

Subject Number	TV time tracker HH.MM	Questionnaire watching time			Number of family members
		Less than hour	1 hour to 3	More than 3 hours	
27	6.54	NA			NA
10	6.56			X	1
14	11.24		X		0
1	NA	X			4 or more
16	11.50		X		3
18	10.07			X	1
23	2.10	X			1
32	3.32		X		1
33	NA	X			1
39	5.54		X		2
42	NA			X	2
44	NA	X			2
45	8.01		X		3
48	NA			X	2
49	8.40	X			2
51	12.40	X			2
53	6.04	X			1
56	11.33			X	1
57	14.05			X	2
59	3.07	X			4 or more
71	NA			X	NA
72	8.45		X		1
26	2.27	NA			NA

Heart rate comparison.

The mean score for heart rate in the control group was 90.49 (n=26), and in the experimental group was 84.60 (n= 24) (Figure 4.2). The average heart rate for women during labor is 80 to100. However, mothers can experience slow heart rate with the usage of Epidural (Mehl-Madrona and Mehl-Madrona, 2008).

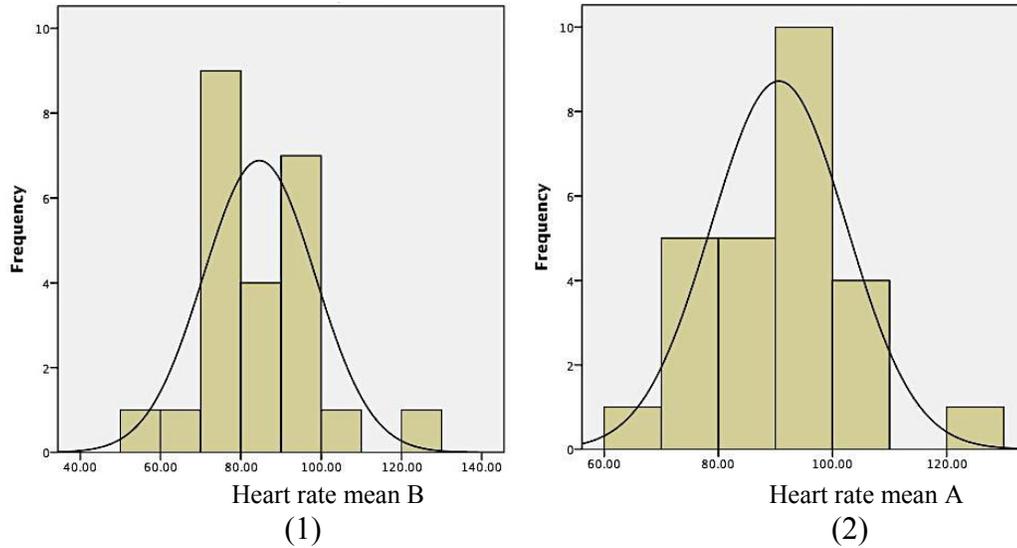


Figure 4.2. Heart rate mean: (1) experimental group, (2) control group

Blood pressure comparison.

The systolic mean of the blood pressure was 123.6 for the control group (n=26), and 122.8 for the experimental group, (n=24). For the diastolic blood pressure mean, the control group’s score was 72.3, and the experimental group’s score was 72.7.

Normal blood pressure during the first stage of labor is 100/60 mm Hg or above, but less than 140/90 mm Hg (Maternal care, 2012). However, taking an Epidural will drop a mothers’ blood pressure significantly (Mehl-Madrona & Mehl-Madrona, 2008).

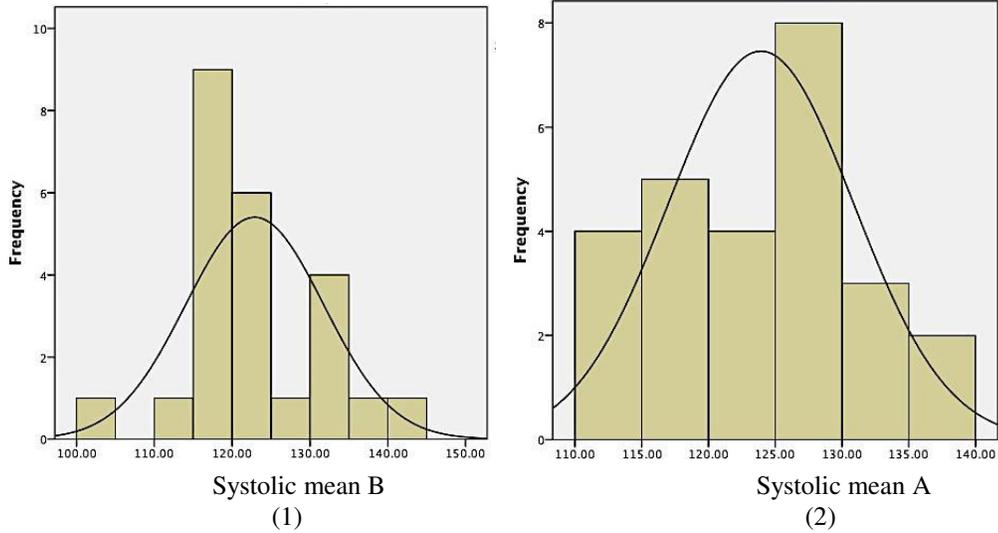


Figure 4.3. Systolic blood pressure: mean (1) experimental group, (2) control group

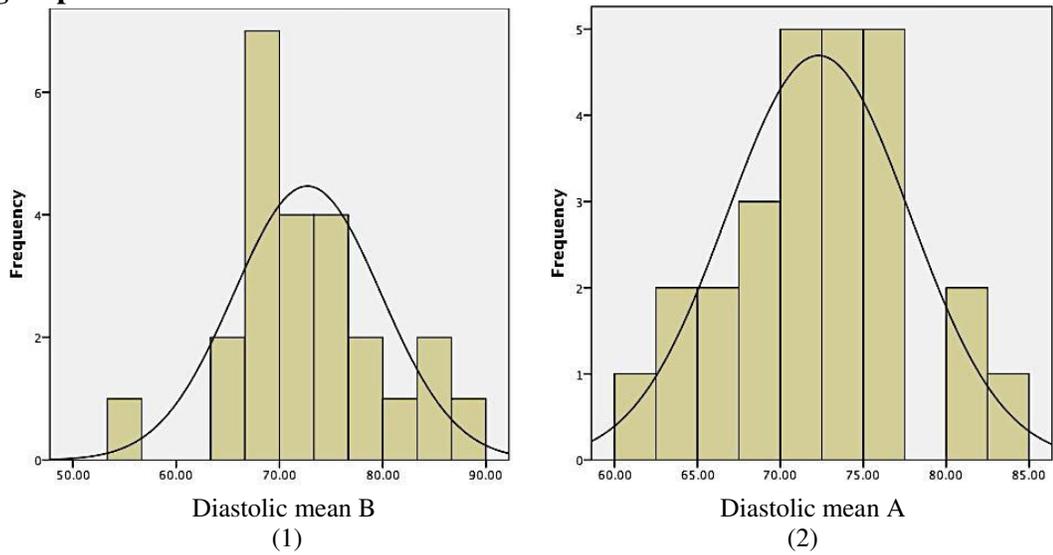


Figure 4.4. Diastolic blood pressure mean (1) experimental group, (2) control group

Labor duration.

The T-test comparison of the labor length showed no difference. For the control group, the labor duration average was 10.8 hours, and for the experimental group it was 10.9 hours.

Apgar scores comparison.

The mean Apgar score (5-minutes assessment) was higher in the experimental group (Group A $m= 8.65$, Group B $m=8.92$) (Table 4.12). The higher the score, the healthier the baby is after birth (Zieve & Kaneshiro, 2011). The difference was statistically significant between the two groups $p = .05$. The effect-size of the five minutes APGAR scores was calculated by using the means and standard deviations of two groups. The findings reported Cohen's $d = -.5$, and effect- size $r = -.2$, which indicated a small effect.

Table 4.12. Apgar scores comparison (5-minutes assessment).

Group		N	Mean	Std. Deviation	Std. Error Mean
Apgar Score	A	26	8.65	.689	.135
	B	24	8.92	.408	.083

Epidural and pain medication requests.

There was no significant difference between the two groups regarding Epidural requests, 87.5% of the participants in the experimental group requested an Epidural, and 12.5% of the participants did not request it. For the control group, 88.5 % requested an Epidural, and 11.5% did not request it.

For other pain medications, 16.7% of the experimental group requested other pain medications, and 83.3% did not. As for the control condition, 15.4% requested additional pain medications, and 84.6% did not.

Mode of delivery.

The study counted the number of participants who were transferred to emergency C-section. Only five participants transferred to C-section, three participants from the control condition and two from the experimental one.

Correlation between the study variables.

Pearson's correlation results showed a significant negative correlation between the QPP mean scores and the usage of pain medications $r=-.37, n=40, p=.017$. The increase of pain medications was associated with lower QQP mean scores.

Heart rate and QPP were negatively correlated $r = -.14$, and the decrease of the heart rate was associated with higher QPP mean scores. However, this correlation was not significant. The following table illustrates the correlation between the study variables (Table 4.13).

Table 4.13. Correlation between the QPP and the study variables.

		Mean QPP Score	Labor Length	Heart Rate MEAN	Systolic mean	Diastolic mean	Apgar Score	Induction	Epidural request	Other pain medications
Mean QPP score	Pearson Correlation	1	-.015	-.137	.064	.103	.122	.259*	-.205	-.370**
	Sig. (1-tailed)		.462	.193	.343	.259	.221	.049	.096	.008
	N	42	42	42	42	42	42	42	42	42
Labor Length	Pearson Correlation	-.015	1	.165	-.091	-.002	-.547**	.072	.135	.154
	Sig. (1-tailed)	.462		.137	.273	.495	.000	.317	.186	.154
	N	42	46	46	46	46	46	46	46	46
Hear Rate Mean	Pearson Correlation	-.137	.165	1	.179	.224	-.156	-.241*	.043	.220
	Sig. (1-tailed)	.193	.137		.106	.059	.139	.046	.383	.062
	N	42	46	50	50	50	50	50	50	50
Systolic Mean	Pearson Correlation	.064	-.091	.179	1	.734**	.087	.007	-.126	-.088
	Sig. (1-tailed)	.343	.273	.106		.000	.274	.482	.191	.272
	N	42	46	50	50	50	50	50	50	50
Diastolic Mean	Pearson Correlation	.103	-.002	.224	.734**	1	.111	.057	-.092	-.209
	Sig. (1-tailed)	.259	.495	.059	.000		.221	.347	.263	.072
	N	42	46	50	50	50	50	50	50	50
Apgar Score	Pearson Correlation	.122	-.547**	-.156	.087	.111	1	.238*	.073	-.212
	Sig. (1-tailed)	.221	.000	.139	.274	.221		.048	.308	.069
	N	42	46	50	50	50	50	50	50	50
Induction	Pearson Correlation	.259*	.072	-.241*	.007	.057	.238*	1	.230	-.272*
	Sig. (1-tailed)	.049	.317	.046	.482	.347	.048		.054	.028
	N	42	46	50	50	50	50	50	50	50
Epidural request	Pearson Correlation	-.205	.135	.043	-.126	-.092	.073	.230	1	.034
	Sig. (1-tailed)	.096	.186	.383	.191	.263	.308	.054		.405
	N	42	46	50	50	50	50	50	52	52
Other pain medications	Pearson Correlation	-.370**	.154	.220	-.088	-.209	-.212	-.272*	.034	1
	Sig. (1-tailed)	.008	.154	.062	.272	.072	.069	.028	.405	
	N	42	46	50	50	50	50	50	52	53

CHAPTER V

DISCUSSION

This study was experimental in nature to examine the effect of nature imagery on women's labor experiences in the LDR environments. The research questions aimed to investigate whether exposure to nature stimulus is associated with an increase in positive labor experiences by examining the following sub-questions (1) whether there is an impact of nature stimulus on the QPP scores between the two groups, (2) if there is an impact of nature stimulus on women's labor duration in the control group and the group of women who watch the nature images TV, (3) the difference in the vital signs between the two groups, (4) whether Epidural or pain medication usage was lower in the experimental group than in the control group, and (5) the difference in Apgar scores between the babies in the control group and the experimental group.

A questionnaire and analysis of the participants' medical records were the instruments used to achieve this objective. These data were collected from participants who delivered their babies at the UMC Family Birth Center. The results of the data collection were analyzed and the major findings of this study are discussed in this chapter. The results show that introducing nature imagery to the LDR had positive impacts on women during labor, including lower heart rates, higher APGAR scores, and higher QPP scores in the evaluation of their labor experiences. This study also includes recommendations for future research and a discussion of its limitations.

Labor Experience

Is exposure to nature stimulus associated with an increase in positive labor experiences?

In order to answer this question, multiple analyses were conducted to examine each variable of the study. A QPP sub-scale evaluated the participants' opinions about their labor experiences. The chosen items from the QPP scale focused on the feeling and the psychological aspects of labor. The overall QPP mean scores were slightly higher for the experimental condition, which is associated with a more satisfying labor experience. However, the overall QPP increase was not statistically significant, but the individual items analyses showed three questions were significantly different between the two groups.

The first question that was significantly different between the two groups was to evaluate the participants' feelings regarding whether they have been taken seriously and treated with respect by doctors. Adding the nature images TV to the LDR affected women's feelings about their doctors' attitudes. This question was related to the importance of engaging mothers into decision-making, which was documented in several studies (Hodnett, 2002; Mills & Sullivan, 1999; Green et al., 1990; Gibbins & Thomson, 2001). When women felt they did not have an active say in making decisions regarding their situations, satisfaction with their labor experiences decreased. However, a Waldenstrom (1999) study explored variables related to women's labor and birth experiences and did not find statistical differences between women who had positive experiences and those who had negative ones regarding the need to take part in decision-making.

The second question regarded whether women felt that doctors showed them sympathy when they were suffering from anxiety or pain. This question was related to the caregivers' attitudes and the support they showed to the mother during labor. This supports what was established in literature: that having supportive caregivers and staff is associated with couples' level of satisfaction during labor (Hung & Lee, 1997). Another study found that the level of support from hospital staff during childbirth has a greater impact on women's emotional responses. It also promotes perceived control and decreases anxiety and negative attitude (Ford & Ayers, 2009). The nature images TV seems to have an impact on women's feelings regarding this question from the QPP sub-scale. Support, information, intervention, decision making, and pain relief are some of the aspects that were revealed in a trial study investigating the aspects of a woman's childbirth experience that were perceived as important (Lavender, Walkinshaw & Walton, 1999). Satisfaction with the labor experience was related to previous childbirth; women who had multiple childbirths had more positive experiences than first-time mothers (Waldenstrom, 1999). The study findings showed similar results; women who had previous childbirth scored a higher mean in the QPP sub-scale compared to the first-time mothers.

Another aspect that affects women's satisfaction with the labor experience was the type of childbirth (Macky, 1998). The satisfaction with the labor experience was higher in the group of women who had vaginal birth than those who had C-section (Hart & Foster, 1997; Macky, 1998). In this study, two women in the control group had an emergency C-section, and two women in the experimental group had C-section after hours of laboring.

The following section elaborates the study sub-questions.

Question 1: Did the participants in the experimental condition achieve higher QPP scores than participants in the control condition?

The study findings showed higher QPP mean scores for the group of participants who watched nature imagery, which indicates higher satisfaction with their labor experiences. Access to nature or to nature imagery was recommended by England and Horowitz (1998) to help women cope with the pain during labor. They suggested adding imagination to breath awareness techniques, for example, imagining a flower opening slowly. That will keep the brain busy focusing on slow breathing and on imagining the flower image, which leaves a limited ability to concentrate on the pain” works better (England & Horowitz, 1998). limited amount of concentration on the pain (England & Horowitz, 1998). Adding nature imagery to the LDR environment could facilitate such a technique and encourage it, especially with exercising these kinds of techniques before going to labor.

Question 2: Is there an impact of nature stimulus on women’s labor duration?

The comparison of the labor length for the two groups showed no difference. The labor length can be a factor in a woman’s evaluation of her labor experience; long labor was associated with dissatisfaction in some studies (Waldenstrom, Borg, Olsson, Skold & Wall, 1996). However, some women who experienced difficulties during labor still achieved a sense of control and evaluated the experience as a positive one (Green et al., 1990). The study findings were different than the one that showed introducing into the labor and delivery room movable screens with an image inspired

by nature decreases the duration of labor by 2.1 hours (Staricoff, Duncan & Wright, 2003).

Question 3: Is there a difference in the vital signs between the two groups?

The analysis of the vital signs included blood pressure (systolic and diastolic separately), and heart rate means. There was no significant difference between the experimental condition and the control one regarding blood pressure. Previous studies documented a decrease in the systolic blood pressure because of the calming nature effect (Coss, 1990; Ulrich et al., 1991). This study found a slight difference between the two groups in the mean of the systolic blood pressure: control group $m = 123.9$, experimental group $m = 122.8$.

In contrast, heart rate was lower in the experimental condition; the experimental condition was $m = 84.60$, while the control condition was $m = 90.49$. The average heart rate is normally between 60 (beats per minute) and 100 (beats per minute) if a person is sitting or lying and relaxed (American Heart Association, 2014). Lower heart rates in the experimental condition support the findings from literature that nature imagery can reduce heart rate and autonomic arousal (Ulrich, 1993; Ulrich et al., 1991; Laumann, Garling & Stormark, 2003). When blood pressure or heart rates decrease but are still in the normal level, it means the person is less stressed and calm. According to (Mayoclinic, 2014) relaxation techniques can reduce stress symptoms by slowing the heart rate and reducing blood pressure. Incorporating representative types of nature into the LDR can cause this calming effect, which is shown in the slight decrease of the vital signs level.

However, vital signs can be affected by other variables including induction, Epidural Anesthesia, and labor duration. For instance, taking an Epidural will drop a mother's vital signs significantly (Mehl-Madrona & Mehl-Madrona, 2008). In this study, about 88% of the mothers in both groups requested Epidural, which may eliminate the explanation that vital signs decreased in the experimental condition because of the Epidural effect.

Question 4: Is the Epidural or pain medications usage lower in the experimental group than in the control group?

There was no significant difference between the two groups in requesting Epidural.

The usage of the Epidural was high in both groups: control group=88.5 %, experimental group= 87.5%. The study results were different than the Staricoff, Duncan and Wright, (2003) study. Their findings showed a 7% decrease in the frequency of Epidural Anesthesia requests in the study group when a movable screen with an image inspired by nature was introduced into the labor and delivery room.

Question 5: Are the Apgar scores higher in the experimental group than in the control group?

The study results showed a higher average Apgar score for the experimental group $m = 8.92$, and for the control group $m = 8.56$. The Apgar score is associated with several factors including high-risk pregnancy, C-section, and whether the mother had a good labor or complicated one (Hirsch, 2011). In addition, a difficult birth or pain relief during labor such as pethidine may artificially suppress scores so that the Apgar does not report the baby's true condition (Baby Center Australia Medical Advisory Board, 2010). Studies also showed that psychological stresses during pregnancy may cause

complications which directly affect both the mother and the newborn, including the APGAR score. For instance, Prolonged First Stage of Labor was associated with an increased risk for Uterine Inertia, Prolonged Second Stage of Labor, Rotation, Indicated Low Forceps, and low Apgar score 5-7 (Erickson, 1976, p. 210)

VandeVusse, Irland, Berner, Fuller, and Adams (2007) conducted a study to examine the effect of self-hypnosis training sessions on a woman's labor experience. The study findings suggested that the use of self-hypnosis may have benefits for both mothers and infants. Infants in the hypnosis condition had significantly better 1-minute Apgar scores than those in the control condition (Landolt & Milling, 2011).

Higher Apgar scores for the experimental condition can be associated with having a better labor experience for this group of participants.

Labor experience and pain.

In the context of LDR settings, in general, three factors have been associated with a woman's overall labor and birth experience in literature: perceived control, social support, and pain (Waldenstrom, 1999). The experience of pain during labor is the result of the complex processing of multiple physiologic and psychosocial factors on a woman's individual interpretation of nociceptive labor stimuli (Lowe, 2002). One study showed that nonmedical care during labor, such as massage, emotional support and encouragement, and assistance with communication between the mother and staff to assist her in making informed decisions, were found to be beneficial to the mother. These benefits included a decrease in the use of Epidural and pain medication. However, these trials suggested using such techniques during the early labor

(beginning with active labor or before) for more effective results (Simkin & O'Hara, 2002). The study results showed a significant negative correlation between the pain medication and the evaluation of one's labor experience. That supports the findings from literature that analgesia and medical interventions in labor were associated with a negative birth experience (Waldenstrom, 1999).

Increased satisfaction with the labor experience along with a decrease in using pain medications can be explained in two ways: painful labor affected women's satisfaction with the labor experience, or using the pain medication itself was the factor affecting their satisfaction with the labor experience.

According to Hodnett (2002), pain relief and satisfaction with pain relief are not the same, even if some researchers have defined them equally. For instance, either pain evaluation was different but satisfaction ratings were not, or pain ratings were not different but satisfaction with pain relief was. The environment affects the woman's experience of pain (Lowe, 2002), and that emphasizes the importance of integrating elements in the environment that can soothe and reduce pain. The experimental group in this study had access to nature imagery, and they evaluated the pleasantness of the LDR environment as compared to the control condition. In literature, the pleasantness of the Labor and Delivery room was one of the factors emphasized by women as one of the most important aspects of the LDR environment (Singh & Newburn study, 2003).

The implications of the study on environmental design.

Women have been encouraged to use non-pharmacologic methods, such as Lamaze classes, during labor for their effect on promoting control and achieving

higher satisfaction with the experience (Mackey, 1995). In addition, some cognitive activities based on visualization or guided imagery were found to be powerful strategies for helping women with pain management (Jones, 1987, 1988, as cited in Lowe, 1996). Most of these exercises and techniques during labor depend on the concept of distracting the mother's focus away from pain or any negative outcomes, such as anxiety and stress. It would be valuable for expecting mothers to be provided with a, LDR environment that facilitated these techniques and encourage them.

Accessing a view of nature was recommended in literature, especially with a form of water, such as a garden with a fountain (England & Horowitz, 1998). However, this kind of accessibility is not always available, especially at night. That increased the importance of building a Labor and Delivery environment with several options for accessing to nature.

Singh and Newburn (2003) reported that women find the midwives' encouragement of trying different techniques to cope with pain as a very supportive feature. The designed Labor and Delivery rooms can include a variety of options to achieve this goal and support women physically and psychologically, such as access to a form of water (e.g. pool, bathtub), access to a view of nature, and increasing a mother's control of lighting and room temperature. Taking this need or preference into account when designing LDR units would open a variety of opportunities to encourage non-pharmacological techniques during labor. These techniques not only help increase women's satisfaction with the childbirth experience, but would also save some of the financial expenses of healthcare.

Generalizing the study effect and its implications on administrators and policymakers.

The focus on designing healthcare facilities is changing from an emphasis on the functional delivery of care towards healing environments that are also psychologically supportive (Dijkstra, Pieterse, & Pruyn, 2006). These changes were done to achieve the patients' highest satisfaction level. In addition, changes in the provided care were proven to lower financial costs, even if these changes are not major ones. For example, hospitals saved 30 thousand to 50 thousand dollars a year when they added room service. The third meal in hospitals was rejected and wasted when patients were not happy with it. Integrating similar changes to the LDR design would help to reduce financial costs as well. Access to nature images can help the mothers to cope with pain without the side effects and the additional costs of using medical methods to sooth pain. In addition, this study found that adding the nature images to the LDR increases mother satisfaction by 3.5%. Healthcare organizations should create environments to achieve higher patient satisfaction and encourage repeat visits, which increases profit (Fottler, & Ford, 2000). If the mother and her family received the level of care they hope for, that will encourage them to considering this facility for any future care. That stressed the importance of administrators, policymakers and providers understanding that women's satisfaction with their childbirth experience is an indicator of maternity care quality (Hodnett, 2002). This study suggested incorporating nature imagery into the patient's environment to achieve the previous goals: higher patient satisfaction, lower side effects, and lower financial costs. Exposure to nature imagery can be a safe, inexpensive way to enhance analgesia, with none of the risks or side effects caused by medications (Diette et al.,

2003). Adding nature imagery to the LDR gives similar effects to adding access to nature as a fixed part of the childbirth environment to achieve higher satisfaction and to reduce any negative outcomes associated with using medical or pharmacological pain relief methods. It also will help the healthcare provider meet customer's needs for experienced care, and physical and psychological comfort.

Theories suggest that there is a healing power of nature, which lies in the unconscious response to elements from nature. Certain natural places may be viewed by the unconscious mind as safe places in which human beings used to have greater rates of survival (Bratman et al., 2012). Such theories support the idea that incorporating nature images into the healthcare environments can be beneficial for most health populations, despite cultural or spiritual differences. This idea becomes more important in LDR settings since most of those women are not suffering from diseases that could affect their responses toward nature. If the brain or unconscious responses cause the positive response to being exposed to nature, then the nature theme in designing LDR would significantly help mothers achieve a positive childbirth experience.

Conclusion.

“Childbirth satisfaction is a complex, multidimensional construct that may change over time” (Hodnett, 2002, p. 170S). In one study, women emphasized the importance of having a relaxing and comfortable environment to encourage the type of labor they desired (Singh & Newburn, 2006). This environment includes a homelike room, access to music, TV and a telephone, adjustable lighting, availability of pillows, bean bags and mats, and a birth pool or large bath (Singh & Newburn, 2006). In

contrast, the aspects of the LDR environment most frequently considered unfavorable were having a clinical-looking room and having limited space to move around (Singh & Newburn, 2006). According to England and Horowitz (1998), there are specific types of birth environments that appear to connect with primitive brain processes during childbirth. Privacy, warmth and darkness, water, freedom of movement, and social support are the characteristic of such an environment (England & Horowitz, 1998, p.199). The LDR units can benefit from adding some environmental aspects that serve as a distraction from labor pain or as relaxation elements, especially with the increasing number of Birth Centers that are focusing on homelike or spa-like concepts in design.

Future research.

There were comments by the participants about whether there were sounds or music with the nature images. Soothing music and sounds from nature are recommended during the intense labor, and music that encourages movement is suggested for slow labor (England & Horowitz, 1998). Extending this study to investigate the impact of a combination of nature images and nature sounds on the labor experience will have significant benefits for women and potentially for soothing pain.

Another suggestion by the participants was to increase the options of the images. Since there are subjective preferences regarding what a person likes to watch, especially in a situation like labor it would be valuable to conduct a study investigating the effect on a mother's experience of images chosen by her prior to delivery. This would also increase several positive outputs such as patients' control and personalization of the environment.

One of the study results was higher satisfaction among women who had previously given childbirth. The study can be expanded to examine satisfaction when the variable of previous childbirth is controlled.

Literature suggested cultural differences in the perceived pain during labor and overall labor experience. According to Lowe, (1996) labor pain is influenced by an individual woman's physiology and psychology, and the sociology of the culture surrounding her. That culture not only involves the beliefs, morals, and standards of her family and community, but also those of the health care system and its providers (Lowe, 2002, p. S16). Conducting a comparison study to investigate the effect of nature imagery on two different cultures will assist designers in building appropriate birth environments for different cultural needs. Additionally, it will demonstrate if nature imagery has a universally positive effect on women from different cultures and backgrounds.

Finally, there were suggestions in literature regarding the effectiveness of positive distraction time during labor. It was suggested to use any visual distraction at the beginning of the labor (Lowe, 1996; England & Horowitz, 1998). It would be beneficial to extend this study to examine the differences in labor experience when participants are exposed to visual positive distraction in different stages of labor.

Limitations

The calculation for the appropriate sample size based on the study variable showed a number of 102 per group was the proper number for such a study. However, the study was conducted in one Birth Center in a rural city, which limited the sample size to 60 participants. This limitation surely affected the results. In addition, in order

to control environmental elements, the chosen size of the experimental TV was based on the available TV at the Birth Center LDR. This TV size did not cover the whole vision field, which might have impacted the participants' experiences.

In addition, there are some uncontrollable variables that might threaten the study's validity. These variables include previous childbirth, labor complications and sample randomizing issues. The exact admission time of childbirth is not predictable; there was an issue with randomizing the participants. Some participants delivered before the randomization and others during the labor process. In addition, some participants were missed due to miscommunication between the study team and the participants.

The questionnaire collection process was not sufficient, which caused losing a number of the questionnaires either because of miscommunication between the LDR and post-delivery staff, or because the participants had to complete a lot of paperwork before being discharged which made them return the questionnaire blank. Another issue that appeared with the data collection was the limited control over the TV setup time, which can give a variety of results. When the research team was notified of the participant's check-in for delivery, they set up the TV in the participant's room. However, this notification took place at different points in participants' labor.

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APPENDIX A

RESEARCH INFORMATION

Examining the Labor Experience in LDR Units

Dear Participant,

We are asking for your help with a research project related to healthcare environmental design. We want to know about your level of satisfaction with the experience of the birth of your child. You can help by answering questions on two surveys. One with 8 questions asks about you and your history. The second has 29 questions that ask you to indicate how much you agree or disagree with statements about the experience of delivering your baby.. It will take less than 15 minutes to answer both surveys. After you complete them, please return them to the discharge package envelope.

All the information will be used anonymously. We will use a code system such that any information obtained in connection with this study that can be identified as relating to you will remain confidential. The data will be stored computer without your name and the code will be destroyed after the data has been analyzed. You can skip questions on the survey and quit at anytime.

If you have any questions, you can contact us through email at robert.casanova@ttuhsc.edu or rehab.a.aburas@ttu.edu . For questions about your rights as a subject, contact the Health Sciences Center IRB, Texas Tech University Lubbock, Texas 79409, or please call TTUHSC hotline at 1-800-396-0918

Thank you for taking time to complete the questionnaire

APPENDIX B

CONSENT FORM

Clinical Research Consent 1331



This consent form is not valid without a TTUHSC IRB stamp in the lower left corner of each page.

CONSENT TO TAKE PART IN A RESEARCH STUDY
Signed copy to be provided to subject or authorized representative

This is a research study for people who voluntarily choose to take part. Please take your time to make a decision, and discuss the study with your personal doctor, family and friends if you wish.

STUDY TITLE: Examining the Influence of Nature Stimulus in Enhancing Labor Experience in LDR Units

INVESTIGATORS: Robert Casanova, MD
Rehab Aburas

CONTACT TELEPHONE NUMBERS: 806-743-2295 or 562-324-8180
(You may contact the investigators at the numbers listed above during normal business hours if you develop any of the conditions listed in Question #6 of this form or if you have any unexpected complications.)

INSTITUTIONS: Texas Tech University Health Sciences Center
University Medical Center
Texas Tech University, Human Sciences, Department of Design

- 1. Why is this study being done?**
The purpose of this study is to learn about how images of nature impact women during labor and delivery. This information may help hospitals improve women's childbirth experience.
- 2. How many people will take part in this study?**
About 200 women will take part in this study.
- 3. Why am I being asked to take part in this research study?**
You are being asked to take part in this study because you are planning to have your baby at University Medical Center in Lubbock, Texas.
- 4. What will happen during this study? What will be done that is different from my usual care?**
In order to find out how images of nature impact the childbirth experience, we will collect information on two study groups:
Group A: Women with access to regular TV during childbirth.
Group B: Women with access to two TVs, one with regular TV programming and one with nature images.

After consent is given, you will be given a participation card to hand in when you arrive at the hospital in labor.

When you arrive at the hospital, you will be randomly assigned (like flipping a coin) to one of



the two study groups. During delivery, women in Group A can view regular TV programming. Women in Group B can view regular TV programming and a DVD of nature images. Tracking devices will be placed on all TVs to record how many hours you watched TV and/or the nature DVD.

After delivery, all participants will be given two questionnaires. The first questionnaire will ask for information such as your age, level of education, and number of previous childbirths. The second questionnaire will ask you about your experience during childbirth. You can return the questionnaires any time before discharge.

Vital sign and delivery information will also be collected from your medical record.

5. **How much of my time will this study take? How long will I be in the study?**
Taking part in this study will not add any time to your delivery or hospital stay. Both questionnaires will take less than 20 minutes to complete.
6. **What are the risks and/or discomforts to me if I join this study?**
There are no physical risks involved in this study. However, possible loss of confidentiality is a risk.
7. **Will there be any added risks to me from this study if I am a female?**
Only females will take part in this study.
8. **Are there any benefits to me if I take part in this study?**
No
9. **What other choices do I have if I don't take part in the research study?**
This study does not involve treatment. You do not have to take part in this study.
10. **What about confidentiality and the privacy of my records?**
We will keep your involvement in this research study confidential to the extent permitted by law. In addition to the staff carrying out this study, others may learn that you are in the study. This might include federal regulatory agencies such as the Food and Drug Administration (FDA) and the Office for Human Research Protection (OHRP), Texas Tech University Health Sciences Center (TTUHSC) representatives, and the TTUHSC Institutional Review Board (a committee that reviews and approves research). These people may review and copy records involving this research. A copy of this document may be placed in your medical record.

Study results that are used in publications or presentations will not use your name.
11. **Who is funding this study?**
The UMC birth center and the Department of Design at Texas Tech University are providing the space and supplies for this study. No one on the research staff will receive anything of value from other agencies, organizations, or companies to carry out this research.



12. Will it cost me anything to take part in this research study?

No.

13. Will I receive anything for taking part in this research study?

No.

14. Does anyone on the research staff have a personal financial interest in this study?

No.

15. What if I am hurt by participating in this study?

Texas Tech University Health Sciences Center and its affiliates do not offer to pay for or cover the cost of medical treatment for research related illness or injury. No funds have been set aside to pay or reimburse you in the event of such injury or illness unless specifically stated.

If you have a research related illness or injury, care will be available to you as usual, but you and/or your medical or hospital insurance company will be responsible for the cost of treatment. Before entering this study, you should check whether your insurance company might limit your insurance coverage if you take part in a research study.

16. What are my rights as a voluntary participant?

- Taking part in this study is your choice. You may choose not to be in it. If you decide not to be in the study, it will not affect any medical care, benefits or rights to which you are entitled.
- If you sign this form, it means that you choose to be in the study. If new information becomes available during the study that may affect your willingness to take part in the study, you will be told.

17. Can I stop being in the study?

- You may leave the study at any time. If you do, discuss it with the investigator, who will help you leave the study in the safest way.
- If you leave the study, your right to standard medical care will continue.
- If you leave the study, we cannot remove any information we have collected to that point.

18. Can someone else end my participation in the study?

Under certain circumstances, the investigators, TTUHSC, or the study sponsor may decide to end your participation in this research study earlier than planned. This might happen if you have any complications during birth or a cesarean section instead of natural birth.

19. What if I have questions?

For questions about this study, contact the Investigator, Dr. Robert Casanova, at 806-743-2295 or 562-324-8180.

If you would like to speak to someone who is not involved in the study about your rights as a participant, research-related injuries, or any other matter related to the study, you can call the TTUHSC Research Protection Hotline: 1-800-396-0918.



Your signature indicates that

- this research study has been explained to you;
- you've been given the opportunity to ask questions;
- you accept your responsibility to follow the instructions given to you by the research team regarding study participation and, if applicable, research medication;
- you agree to take part in this study.

You will be given a signed copy of this form.

Printed Name of Subject

Signature of Subject

Date Time

Signature of Parent/Guardian
or Authorized Representative

Date Time

(Investigator: Witness is to sign below ONLY if subject is unable to read the written consent form. If they or authorized representative can read the consent form, leave this section BLANK)

_____ Subject was unable to read and understand the written consent.

The elements of informed consent required by 45 CFR 46.116 and 21 CFR 50 have been presented orally to the subject or the subject's authorized representative in a language understandable to the subject or representative.

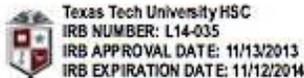
Signature of Witness to Oral Presentation

Date Time

I have discussed this research study with the subject and his or her authorized representative, using language that is understandable and appropriate. I believe I have fully informed the subject of the possible risks and benefits, and I believe the subject understands this explanation. I have given a copy of this form to the subject.

Signature of authorized research personnel who
conducted the informed consent discussion

Date Time





TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER (TTUHSC)
AUTHORIZATION TO USE AND/OR DISCLOSE
YOUR PROTECTED HEALTH INFORMATION for a RESEARCH STUDY

STUDY TITLE: Examining the Influence of Nature Stimulus in Enhancing Labor Experience
in LDR Units

This form is intended to tell you about the use and/or disclosure (sharing) of your personal **Protected Health Information (PHI)** if you decide to participate in the research study described on the previous pages. The health information about you that may be used or disclosed is described below. This information is usually found in your medical records. Only the health information about you that is needed for this research study will be used or disclosed. When you consider taking part in this research study, you are also being asked to give your permission for your PHI to be released from your doctors, clinics, and hospitals to the research personnel approved for this research study. This Authorization specifically relates to the research study described in the attached Informed Consent document.

1. This Authorization is valid indefinitely or until such time as legal requirements will allow this Authorization to be destroyed.
2. If you choose to cancel this Authorization, please give notice in writing to:

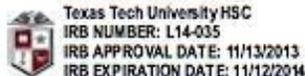
Shauna Baughcum
Institutional Privacy Officer
Office of Institutional Compliance
3601 4th St MS 8165
Lubbock TX 79410

If you sign this Authorization, the following persons, groups or organizations may rely on this Authorization to disclose your Protected Health Information to the Principal Investigator and other research personnel who are conducting this Study:

- your treating physicians and healthcare providers and their staff,
- associated healthcare institutions and hospitals where you have or may receive care.

While this research study is in progress, the Principal Investigator or research personnel working on this study will inform you whether or not you will be allowed to see the research related health information that is created about you or collected by the research personnel prior to the end of the study. After the study is finished you may request this information as allowed by the TTUHSC Notice of Privacy Practices.

The Protected Health Information that you authorize to be used or disclosed for research purposes may include your current or future health information from some or all of your health records, including:





<ul style="list-style-type: none"> • hospital records and reports • admission history, and physical examination • X-ray films and reports; operative reports • laboratory reports, treatment and test results • (including sexually transmitted diseases, HIV or AIDS) • any other Protected Health Information needed by • the research personnel listed above. <p>(* use separate form for disclosure of psychotherapy notes)</p>	<ul style="list-style-type: none"> • immunizations • allergy reports • prescriptions • consultations • clinic notes • mental health records • alcohol / substance abuse records
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For the purposes of this study, your Protected Health Information may need to be reviewed or disclosed to individuals or organizations within and/or outside of TTUHSC who sponsor, approve, assist with, monitor or oversee the conduct of research studies. This includes, but is not limited to, the TTUHSC Institutional Review Board, TTUHSC compliance reviews, the US Food and Drug Administration (FDA) or governmental agencies in other countries. Some of these individuals or organizations may share your health information further, and your health information may not be protected by the same privacy standards that TTUHSC is required to meet.

If you choose to sign this Authorization form, you can change your mind about this later. If you change your mind, send a letter to the person identified above telling us to stop collecting and sharing your Protected Health Information. When we receive your request, you may be asked to leave the research study if all the necessary information has not been collected. We may still use the information about you that we have already collected. We need to know what happens to everyone who starts a research study, not just those people who stay in it.

You have the right to refuse to sign this form. If you choose not to sign this form, your regular health care will not be affected. However, not signing this form will prevent you from participating in this research study and prevent you from receiving research related health care services provided under this study.

I have had the opportunity to review and ask questions regarding this Authorization to use or disclose my personal health information, and I will receive a copy of this form. By signing this Authorization, I am confirming that it reflects my wishes.

Signature of Individual
or Authorized Representative

Date Time

Printed Name

If applicable, Relationship of Authorized
Representative or Authority to Sign

Date Time



APPENDIX C

ORAL SCRIPT

You are receiving this survey packet because you consented to take part in a research study.

[Welcome & Introduction of research members]

Women who plan to have their babies at the UMC birth center are invited to participate in a study designed to examine the impact of the Labor and Delivery Room design on the labor experience satisfaction.

If you decide to take part in this study, you will be asked to complete two questionnaires. You will complete the first questionnaire today, and the second questionnaire after your baby is delivered.

Your responses to the surveys will remain anonymous, you will not be asked to write your name or any identification information on the survey.

If you wish to skip any question or stop at any time, you are free to do so.

Completed questionnaires will be returned with the discharge package.

Your participation is voluntary and you may withdraw from the study at any time after notifying Labor and Delivery room nurses.

Thank you for your time.

APPENDIX D

THE STUDY QUESTIONNAIRES

Demographic Information

Please circle the best answer

1. Please indicate your cultural background.

Caucasian African American

Hispanic Other

Asian

2. Please indicate the cultural background of your child's father.

Caucasian African American

Hispanic Other

Asian

3. Please indicate which age bracket you belong.

Under 20 20-29 30-39 40-49 50 or over

4. Please indicate the highest level of your educational.

Some high school Some post-college

Completed high school or equivalent Completed graduate school

Post high school training Postgraduate study

Completed college/university None of the above

5. Please indicate your marital status.

Married Widowed

Separated Single

Divorced

6. Was this your first childbirth?

Yes No

7. If you circle no, how many childbirths you have had?

1 4

2 More than 4

3

7. Did you watch the nature images TV?

Yes No N/A

8. How long did you watch the nature images TV?

Less than an hour 1 Hour to 3 hours More than 3 hour

9- How many family members and/or friends were in the room while you were in labor?

0 1 2 3 4 or more

10- Are you currently employed?

Yes No

INSTRUCTION ON HOW TO USE THIS SCALE: please try to rate each statement which relates most closely to your experiences of childbirth with 1 Do Not Agree at all, 2 Do not agree, 3 Neutral, 4 Agree, 5 Fully agree

Item	1 Do not agree at all	2 Do not agree	3 Neutral	4 Agree	5 Fully agree
1- The feeling that I have been taken seriously and treated with respect by the doctors					
2- The feeling that I was treated in a positive manner by the doctors					
3- The feeling that the nurses and the assistant nurses were personal in their contact with me					
4- The feeling that the doctors were personal in their contact with me					
5- The feeling that the nurses and the assistant nurses were interested in my experiences (e.g. desire, needs, uplifts, concerns, and hassles)					
6- The feeling that doctors were interested in my experiences (e.g. desire, needs, uplifts, concerns, and hassles)					
7- The feeling that the doctors showed sympathy when I was suffering (e.g. from anxiety or pain, etc)					
8- The feeling that the nurses and the assistant nurses showed sympathy when I was suffering (e.g. from anxiety or pain, etc)					
9- The feeling that the doctors showed interest in my outlook on life (my spiritual needs)					
10- The feeling that the nurses and the assistant nurses showed interest in my outlook on life (my spiritual needs)					
11- The help I wanted/needed to worship according to faith					
12- The feeling that I can trust the doctors and that I received honest and sincere answers to my questions					
13- The feeling that the nurses and the assistant nurses fully understand my situation					
14- The feeling that I can trust the nurses and the assistant nurses that I received honest and sincere answers to my questions					
15- The feeling that the doctors truly understand my situation					
16- The feeling that my family and friend were treated in a positive manner by the doctors					
17- The feeling that my family and friend were treated in a positive manner by the nurses and the assistant nurses					
18- Access to a form of meaningful recreation during the care period					
19- Experience a friendly atmosphere on the ward-which included positive treatment of my fellow-patients as well as between the staff members themselves					
20- Access to a pleasant physical environment rather than a cold and sterile one					

APPENDIX G

PARTICIPATION CARD

Notification Card

Please call Rehab Aburas at **562-324-8180** or the Clinical Research Institute at **806-543-8994** when admitted to the hospital for delivery.

Participant's ID number: _____

Room Number: _____



APPENDIX H

IMAGES





















